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A+

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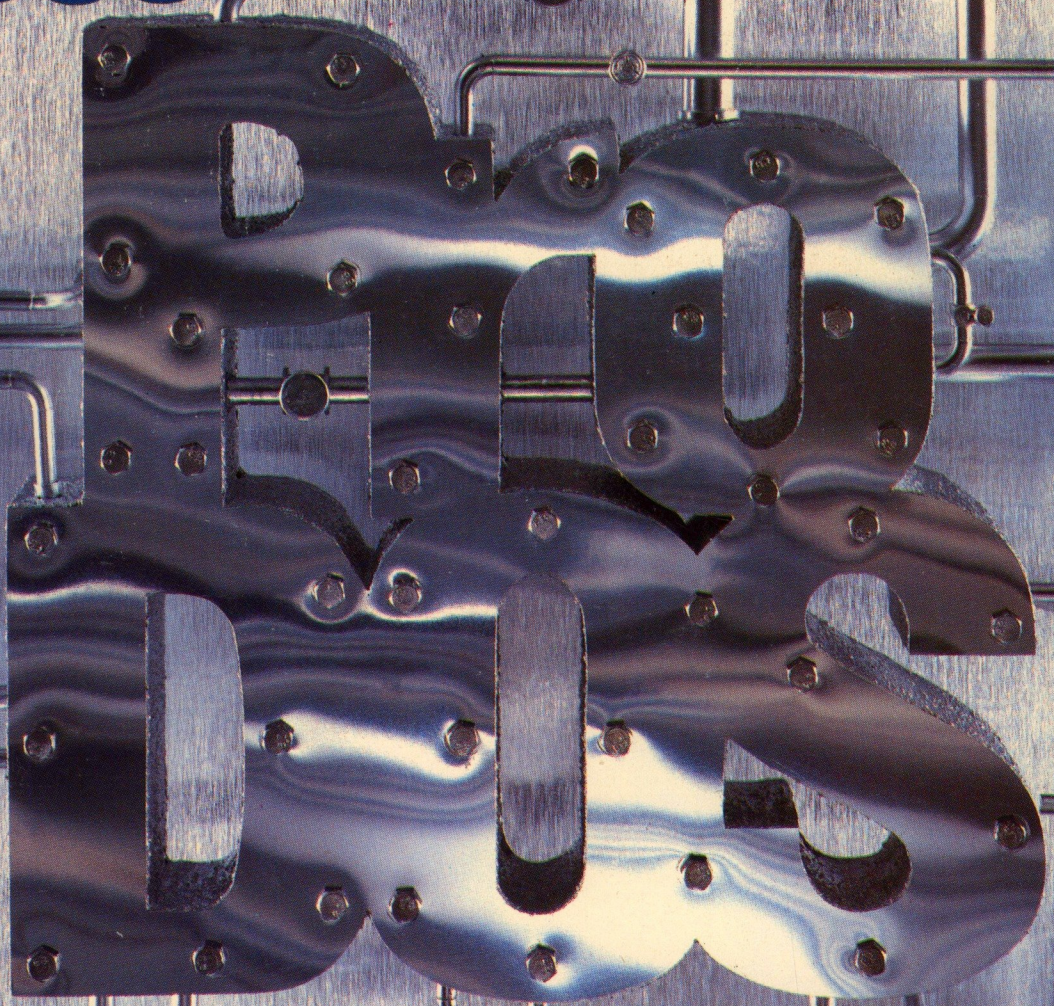

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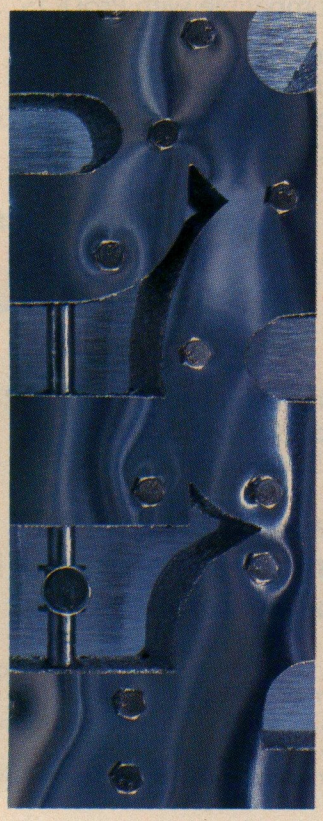

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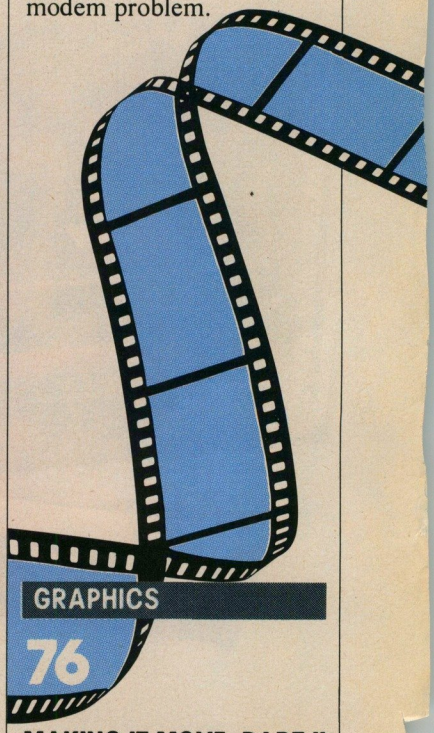

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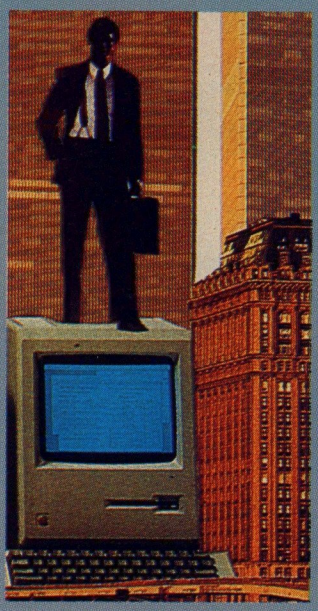

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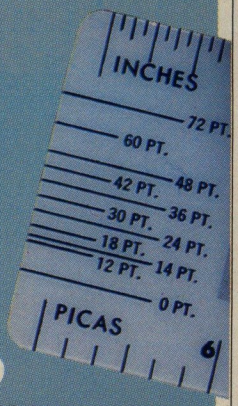

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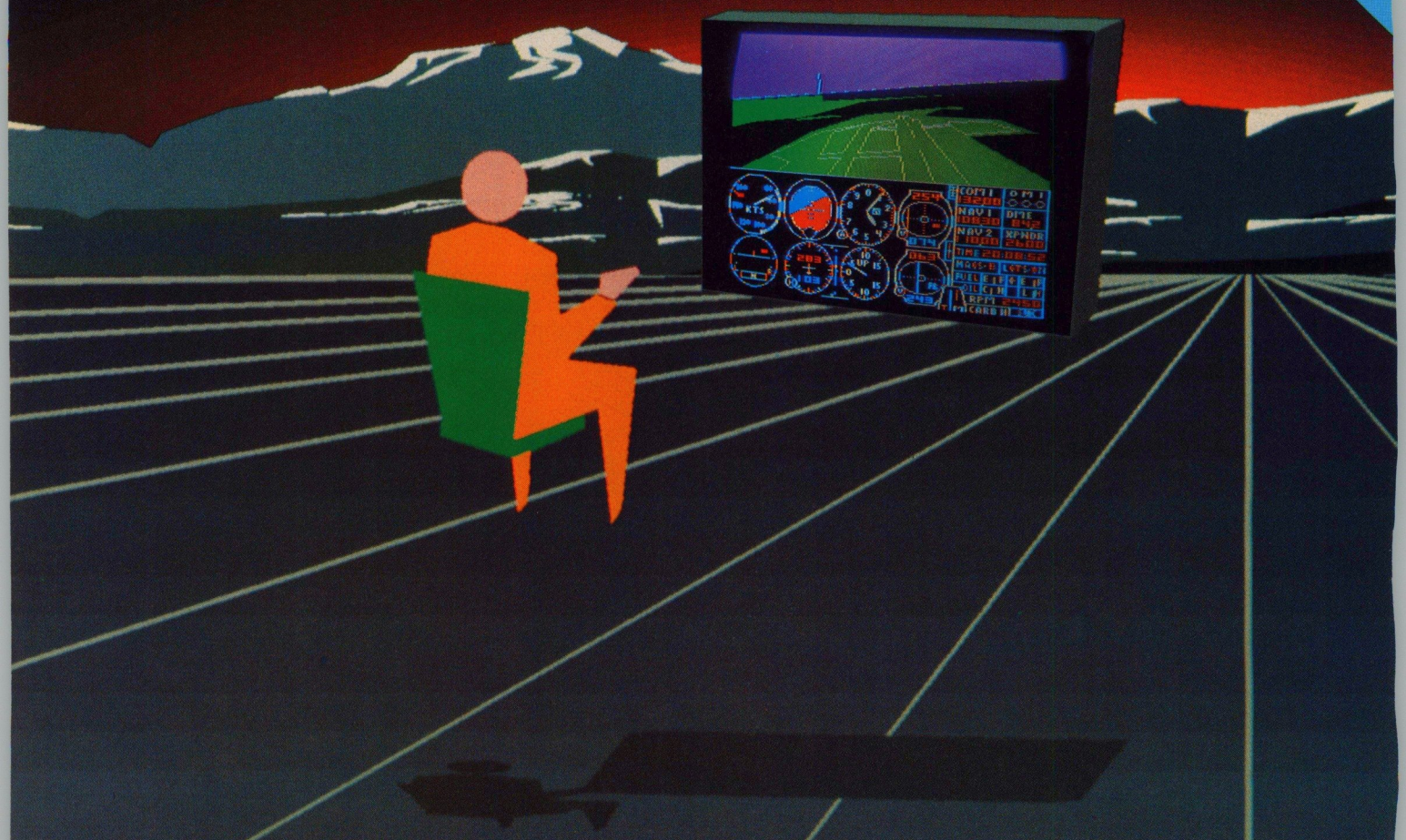
Flight Simulator II

For Apple II, Apple II+, & Apple IIe



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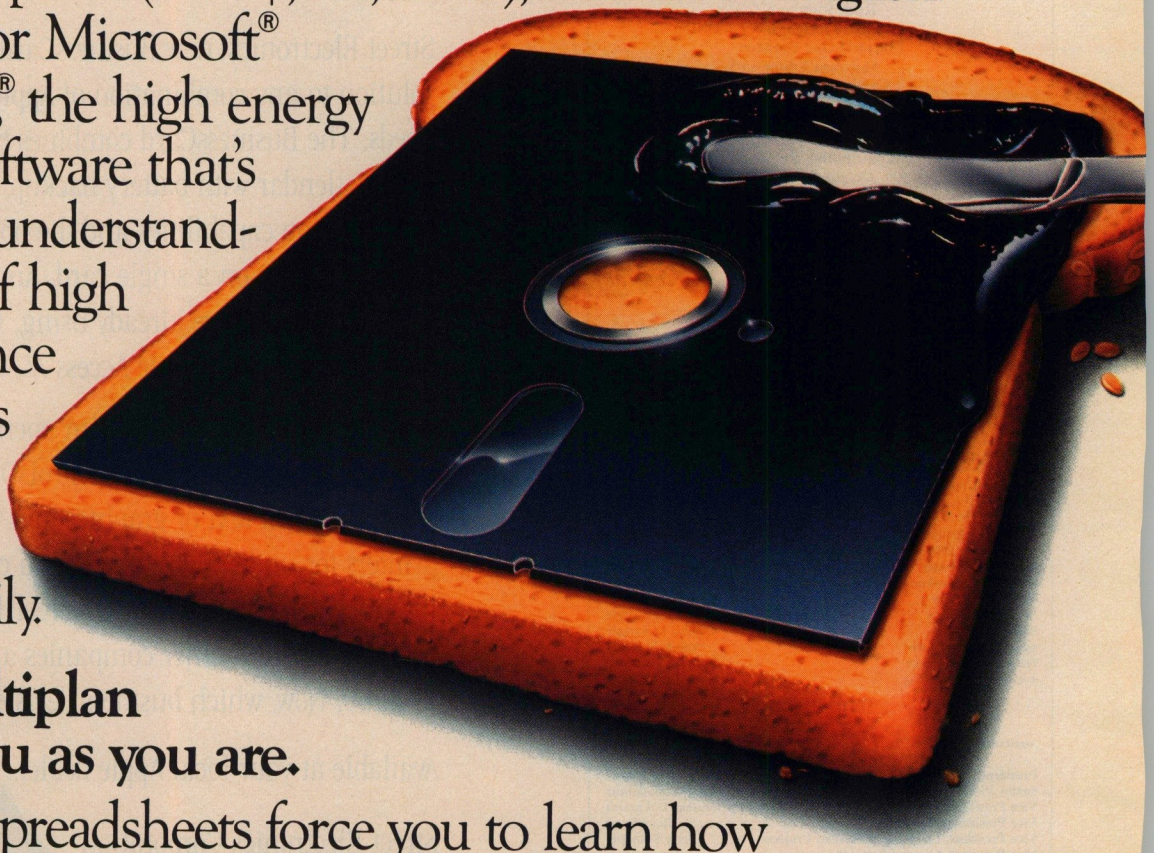

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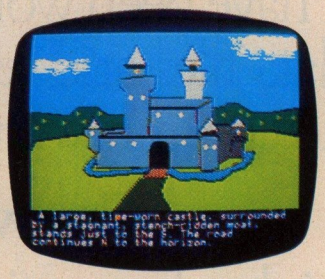
THE BEST KEPT SECRET ABOUT THE APPLE IIc...

Which would you rather view on your screen — standard hi-res or double-res?



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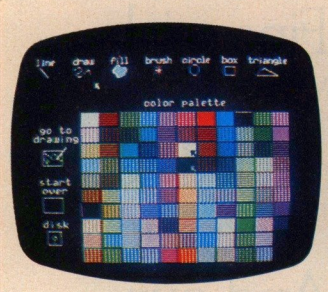

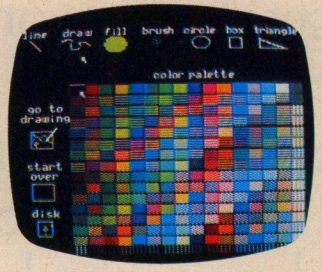

All Apple IIc computers are equipped with the capacity to display double-res graphics, as are all Apple IIe systems with the Extended 80-Column card. With double-res, you get twice as many colors on your palette and much higher resolution. That's almost as big a difference as black-and-white slides of the Painted Desert as opposed to color slides. You get fuller, richer pictures.

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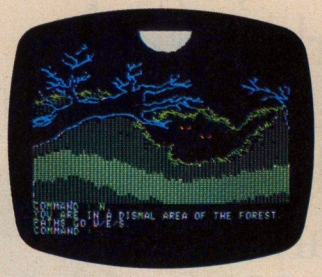

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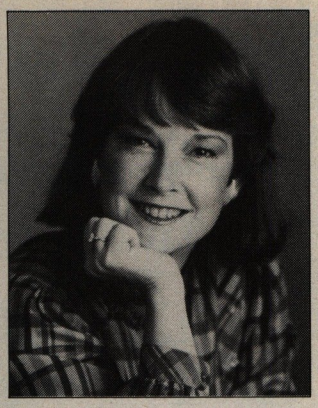

Speech synthesis and voice recognition are at a rudimentary stage now, but they may be the wave of the future.

FORGING NEW FRONTIERS IN TECHNOLOGY

Sometimes I wonder if the dreams of technologists we read and hear about will ever come true. In my mind, scenes click by showing computers that speak and comprehend human language. Reality melts into fantasy even more as the imagination lets go in a make-believe world where robots are mascots and cars obsolete. The technology to produce that scenario seems eons away, yet I wouldn't rule it out within my lifetime.

Although I would love to see some of these scenarios materialize, I am more concerned about the present and about whether or not technologies such as speech synthesis and voice recognition have any real function in the limited form in which they are available today.

The companies that are developing products for speech synthesis and voice recognition, which are a form of artificial intelligence, are truly forging new technological frontiers. The products currently available are still at a relatively crude and unsophisticated stage of development, but they are surprisingly fun and functional.

Some people don't like the stilted sound of a synthesized voice, but I do—there's an element of security in knowing exactly what you are talking to.

The practical applications of the technology are as boundless as the imagination. Our nonresident technical guru Steve Rosenthal spent much of last month finding out about ways to use speech synthesis and voice recognition in your day-to-day life, so be sure to read his articles on pages 34–38 and 40–44.

Computers, as you know, do a great deal more than talking and listening, and this issue is full of interesting articles that bear witness to their versatility.

Since Apple Computer introduced ProDOS, readers have been clamoring for more information on that disk-operating system. If you are interested in this topic, be sure to read our cover story, "Understanding ProDOS," which is the first part of a three-part series on the inner workings of the operating system.

You should also take a look at this month's reviews, especially the review of The Sider, whose advertising has attracted a lot of attention—$695 for a ten-megabyte hard disk, which is low enough to make even the most savvy shopper do a double take.

For our Macintosh readers, we have a review of the new version of ThinkTank for the 512K Mac—a much better product than the 128K version. We also take a closer look at typesetting with a Macintosh and provide a tutorial on using the Dow Jones News/Retrieval service to make investment decisions.

One last thing: We are interested in getting to know the users' groups better for both the Apple II product line and the Macintosh. So if you are a member of a users' group that might like to start a dialogue with *A+*, please send me the name, address, and phone number of your group, and we will be in touch.

I am sure you will find plenty to keep you occupied in this issue, so I'll let you get on with it. Enjoy! ✚

Maggie Canon

MAGGIE CANON/**EDITOR**

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MORE ON PRODOS

Dear *A+*,

We at Pioneer Communications of America have faced problems similar to those stated in Jerry Rutledge's letter (see "Letters to the Editor," *A+*, February 1985). My advice is not to feel ignorant. If you are holding the older version of ProDOS (V1.0), throw it away. There are so many serious problems between ProDOS and the BASIC interpreter that it is just plain unusable. The latest revision of ProDOS, V1.0.1, may have corrected these problems.

Apple did such a good job at developing the new machine-language interface (disk I/O) calls, used at the assembler level, that it rivals some minicomputer interfaces I have seen. I can only say that from assembler, ProDOS is very nice. In addition, there is a manual that describes all the functions and usages of ProDOS called *ProDOS Technical Reference Manual* in Apple's Work Bench series.

Good luck and happy computing.

E. Boroff
Pioneer Communications of America
Columbus, OH

TOO LITTLE ON APPLE III

Dear *A+*,

I am the owner of an Apple III and noiced in your February 1985 issue that not a single thing was said about the III. I realize that you cannot cover every computer, but there is still a good audience out here that would appreciate a little coverage on the III. I think the III is an excellent machine and could give any other computer a run for the money if it were just promoted and marketed right.

Mark S. Baum
Lubbock, TX

Dear *A+*,

I am the proud new owner of an Apple III computer. If your magazine is an "Independent Guide for Apple Computing," why have you not put a column on the Apple III in your magazine? In spite of the negative rumors about the III, Apple Computer, Inc. satisfied its III customers by either repairing the defective machines or replacing them with new ones, which I think is the mark of a good company.

As a concerned owner, I feel left out in the cold without proper guidance. Please have some compassion and give us Apple III users a break.

William W. Sharp
USAF in Europe

Thank you for your letters. We have received quite a few similar complaints. We are not ignoring the Apple III, but because of limited space, we cannot provide articles on the III in every issue. The April issue contained the first part of an Apple III software update that will continue in the next few issues of A+.

FONTRIX INFO

Dear *A+*,

In your February 1985 issue, Roberta Schwartz wrote an article on Data Transforms' Fontrix graphics program. At the end of the article, a note included in the product information states that the IIc and Imagewriter do not support the graphics-dump utility the program provides. I contacted Data Transforms, and one can indeed use a IIc and an Imagewriter with the program. The mouse (if used) is specified to be in slot 4, the Super Serial Card is in slot 2, and the printer must be plugged into the modem port.

Ralph A. Mayer
Winnipeg, Manitoba
Canada

We contacted Data Transforms' customer service and learned that the company has released a new version, Fontrix 1.2. The primary difference is that the new version supports more printers and printer-interface cards.

APPLES IN EUROPE

Dear *A+*,

I have been reading *A+* since it began, and I am often amused by the simplified terms used to describe computer technology. I have at times wondered where the authors get their information.

I have lived in Italy for the last two years and have read with interest the articles, both in *A+* and other magazines, that refer to using the American Apple in Europe, including Philipp Tintner's article in your January 1985 issue.

For my IIc, I use a transformer that was made in Germany and is very reliable. Transformers are easy to come by in Europe; the hardware stores are plenteous, and most Europeans are familiar with voltage transformation.

In Europe the standard hotels do not have TVs in the rooms because the more TVs you have, the more you pay in license fees.

I got a monitor with my IIc; I have seen only one that did not come with a monitor. I would not hesitate to come to Europe with an American Apple IIc or II Plus. I would take along a monitor for the IIc or II Plus, or I would take the LCD for the IIc if available. The use of modems is restricted to European standards and speeds, but I can even get on The Source here in Italy.

I want to compliment you on your magazine. I think it is a good magazine for the money. I subscribe to several, and yours is my favorite.

Paul A. Smith
Italy

CORRECTION

The product-information section that accompanies "Telecommunications" by Mark Andrews (*A+*, March 1985, page 52) incorrectly stated the system requirements for Apple Access II. The program works on an Apple IIe or IIc computer and requires a minimum of 64K RAM.

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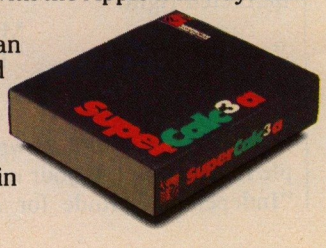

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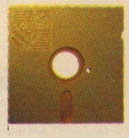

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CIRCLE 179 ON READER SERVICE CARD

NEWS+

BY FREDERIC E. DAVIS

IIc LCD

The new LCD flat-panel display for the Apple IIc is off to a bad start. First, the display is very expensive; the $599 retail price is several times the cost of a good video monitor. Next, the display was brought to market months behind schedule. To make matters worse, the display is very difficult to read.

It's a shame. All of us here at *A+* expected the IIc LCD display to be really great. The display is hard to read because you must view it at just the right angle to see anything at all, and even when you find the proper angle, there is too little contrast between the characters and the background of the display. Until Apple does something to improve this product, let the buyer beware.

For now, if you bought the IIc to use as a portable to take home from work, you'll save money and eyestrain by taking the money it would have cost for the IIc LCD display and buying two standard video monitors, one for the office and one for home. With the money you'll have left, you may be able to buy a small 5- to 7-inch video monitor or a portable TV with a video input. In my opinion, these small video monitors are the best available portable displays.

ROBOT PETS

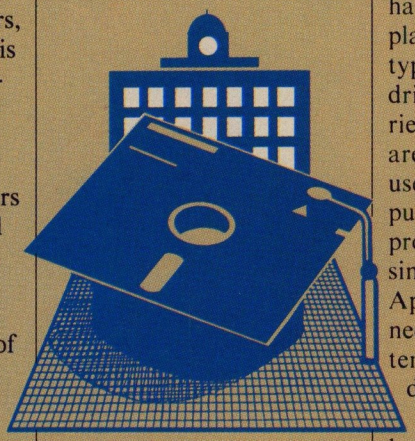
Nolan Bushnell, founder of Atari, Pizza Time Theaters, and Axlon, has dropped his Androbot line of home robots and turned his attention to robot pets called Petsters. Bushnell has grand plans for the Petsters robots and hopes they will replace real animals as household pets. Bushnell claims that the toys ". . . simulate about 80% of the functionality of a cat or dog," which is a pretty outrageous claim.

Petsters retail for less than $100, can move around, and are sensitive to light and sound. The toys have a built-in custom microprocessor with 4K ROM and are programmed for several moods, ranging from happy to sad. The Petsters' built-in computer changes the programmed moods in a random sequence to simulate the behavior of real animals.

WILLIAM CONE

KRELL LETS SCHOOLS TRADE IN SOFTWARE

Krell Software Corporation of Stony Brook, New York, has made a first-of-its-kind trade-in offer. The Krell offer, which expires September 1, 1985, allows schools



to trade in any brand of SAT or ACT test-preparation software, purchased before February 1, 1985, for its full value. The offer will allow schools to upgrade software they own but don't like to Krell's software, without losing their original investment. The full original price the school paid for the old software is applied toward the purchase of Krell software.

Krell's SAT series is the recipient of many accolades, including *Creative Computing*'s 1984 Outstanding Educational Software award. Schools wishing to upgrade to Krell's SAT or ACT software must submit a copy of the original purchase order or invoice along with the software itself. Teachers and school administrators who are interested in the offer can call (800) 245-7355 (outside New York) or (516) 751-5139 (in New York) for further details.

3½-INCH DRIVES FOR APPLE II SERIES

Several Apple developers have told me that Apple plans to introduce Sony-type 3½-inch floppy-disk drives for the Apple II series this year. These drives are the same ones that are used in the Macintosh computer, and they store approximately 400K on a single-sided diskette. The Apple II has long been in need of a floppy-disk system with more storage per diskette.

The new 3½-inch diskettes not only store more than three times as much as a standard Apple II 5¼-inch diskette does, but they are also smaller, more durable, and less prone to accidental media damage, since they protect the read-write surface with a sliding metal shield.

Perhaps the most exciting aspect of having 3½-inch drives for the Apple II series is that it creates the possibility for writing data that a Macintosh can read, and vice versa. This development could lead to an important level of data compatibility between the Mac family and the II series that would make it easier to use both types of computers together in the same school or office setting. We'll be keeping an eye on this development and will let you know more about it in an upcoming issue of *A+*.

CONSORTIUM PRODUCES SOFTWARE

Reed College of Portland, Oregon, has announced the first of a series of software Reed is developing as part of Apple's University Consortium. Reed is developing two lines of software: the Griffin Series and the BenchTop Series. The Griffin Series currently has two products: GriffinTerminal, which is described as ". . . a powerful graphics, animation, file-handling, and interactive terminal," and GriffinText, a companion text editor for fast printing and long documents.

The BenchTop Series has two quite innovative products: The BenchTop and Rascal. The BenchTop is a combination hardware and software system that allows the Macintosh to become a laboratory data-acquisition and -analysis workstation. Rascal is a real-time version of Pascal, developed to allow real-time sensing and control in the laboratory. Rascal has features that allow you to recreate icons on the Macintosh that represent the instrumentation connected to the system.

By using the icons to represent actual pieces of laboratory equipment, BenchTop and Rascal allow you to create a visual laboratory bench top in the tradition of the Macintosh desktop. With other universities also developing products for the Mac, it seems as if Apple's University Consortium is paying off with some tangible results.

MAC DEVELOPMENT OPPORTUNITIES

The Apple II and the IBM PC are the two most popular personal computers, and a lot of high-quality software and hardware is available for these machines. Although it would be hard to break into the Macintosh market with a new word-processing or database program, the Mac is still at the beginning of its technology cycle and is hungry for new applications.

If you're interested in developing software or hardware for the Macintosh, you can either go it alone or you can try to become a certified Macintosh developer. If you're going to go it alone, the good news is that an improved version of the technical reference *Inside Macintosh* is arriving in bookstores from Addison-Wesley. The bad news is that by going it alone, you may be missing out on some valuable assistance from Apple. Although becoming a certified developer requires a bit of bother and you have to pay for the services you receive, it is well worth it if you are serious about your product.

Apple has one of the computer industry's best third-party-developer support programs, one that gives developers access to technical information and support, seminars, marketing assistance, and special developer software tools and utilities. The information and support you'll get by becoming a certified developer can make all the difference in your product-development effort. For further information about becoming a certified Macintosh Developer, contact Macintosh Developers Group MS-2T, Apple Computer, Inc., 20525 Mariani Avenue, Cupertino, CA 95014.

APPLETALK CARD FOR II SERIES

Sources close to Apple report that the company is almost ready to introduce its AppleTalk interface card for the Apple II series. Although we haven't received the official details from Apple, the new plug-in card will apparently allow the Apple II, II Plus, and IIe to connect to the AppleTalk Personal Network and use resources of the Macintosh Office strategy, such as the LaserWriter printer, typesetting machines, and mass-storage systems.

WOZ LEAVES APPLE

Steve Wozniak, cofounder of Apple Computer, Inc., and inventor of the Apple II, is leaving Apple again. Wozniak is teaming up with Apple engineer Joe Ennis and former Apple III project leader Wendell Sanders to start a new video company that will produce home-video-entertainment products. The first product is reported to be a hand-held infrared remote-control device with two built-in microprocessors.

The new company was originally named MBF, which stood for "my best friend." Woz is now thinking of calling his company Cloud Nine, however.

SUN WILL PRIVATE-LABEL LASERWRITER

Apple has made a special agreement that will allow Sun Microsystems to sell the LaserWriter with the Sun logo on the machine. Sun sells a graphics workstation for about $20,000 that is based on the UNIX operating system and has windowing software that is reminiscent of the Mac.

Adobe Systems, creator of the PostScript graphics language used in the LaserWriter, has developed a software product called TranScript that converts UNIX output to PostScript. Sun will add TranScript to the LaserWriter and sell the printer and software for about $1000 more than Apple's retail price for a LaserWriter. +

CHRIS SPOLLEN

CLOSE TO ¼ MILLION APPLE II's SAVED

SYSTEM SAVER® from Kensington Microware quietly protects close to ¼ million Apple® II's every day. Often referred to as "the piece Apple forgot," System Saver's unique combination of features have made it the most versatile, most convenient, best selling accessory ever made for the Apple.

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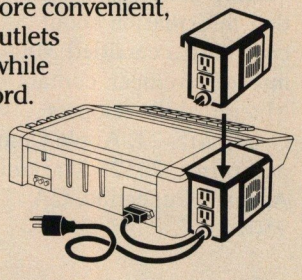

System Saver solves power line problems.
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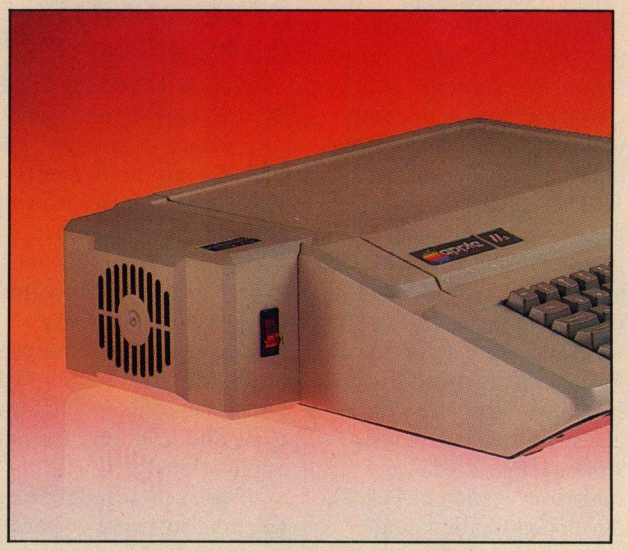

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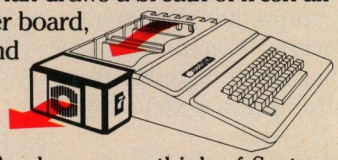

Close to ¼ million Apple owners think of System Saver as the piece Apple forgot. And ¼ million well-protected Apples agree. Available at your local dealer. For more information, contact Kensington Microware, 251 Park Avenue South, NY, NY 10010, (212) 475-5200 Telex: 467383 KML NY.

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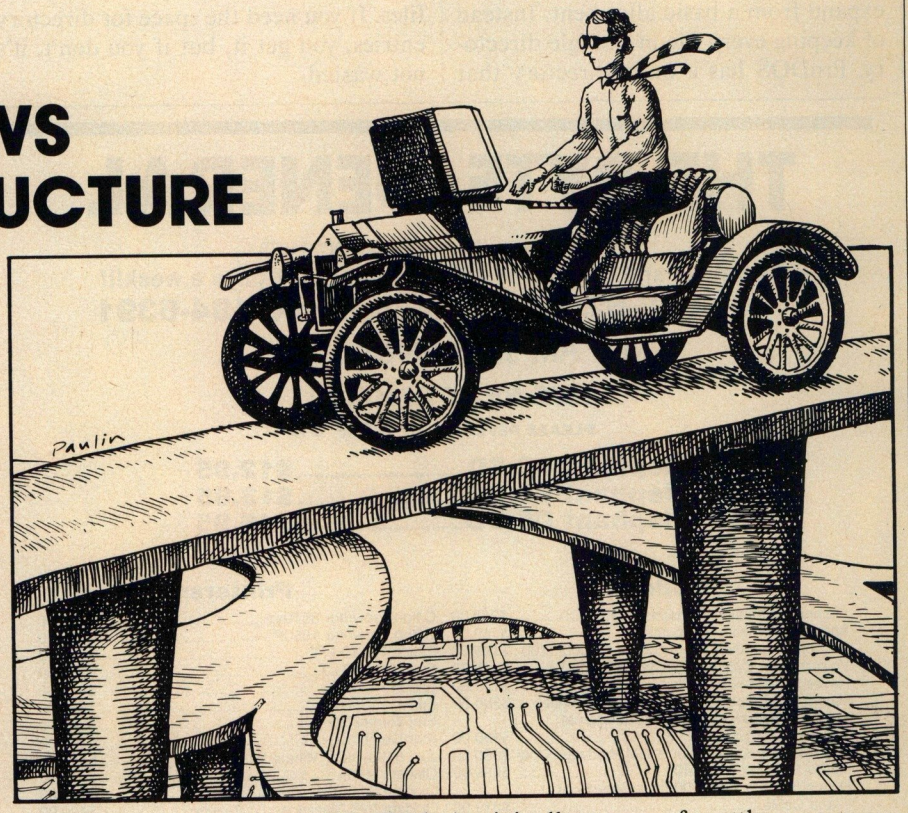
CIRCLE 134 ON READER SERVICE CARD

THOUGHTWARE
BY STEVE ROSENTHAL

Like a new freeway that supercedes a local roadway, ProDOS gets you around DOS's limitations.

ProDOS RENEWS THE INFRASTRUCTURE



You may not have noticed any jackhammers or bulldozers at work, or signs noting a detour, but as part of its campaign to enlarge the data capacity of the Apple II, Apple has designated the ProDOS operating system as the machine's main software route for the future. Just as the time comes when a freeway must replace a traffic-clogged local roadway, operating systems have to be upgraded when their load-carrying capacity fails to keep up with demand.

DOS 3.3 and DOS programs continue to work, of course—floppy disks may wear out, but programs don't suffer from overuse or the ravages of time—but like traffic on the new bypass, which will skirt around the main route through town, most of the new software traffic will pass up the DOS route, leaving principally old-timers, local traffic, and a few curious sightseers.

For its day, like many an old roadway, DOS was an engineering marvel. When Apple introduced its Disk II floppy-disk drive and controller in 1978, most personal computers were using cassette-tape mass storage. The industry had only limited experience with scaling down disk-operating systems to match microcomputer resources. Steve Wozniak had never even used a floppy disk.

DOS lets you load programs from a disk, store data, format disks, and print directories. It takes up a small part of the disk, works with both Applesoft and Integer BASIC, and rarely loses track of your files.

Relatively, and even absolutely, memory and processing power were far more expensive in the late 70s, and optimal performance was less of an issue. The marvel was that Apple was able to produce and market a working, affordable disk system at all. Doing so meant taking advantage of every feature and idiosyncrasy of the hardware. In effect, DOS follows every shortcut and easy grade in the existing terrain it has to traverse. If the route has a few bottlenecks or low clearances, it matters little if traffic is still light.

In effect, DOS follows every shortcut and easy grade in the existing terrain it has to traverse.

DOS suffers from a dependence on public knowledge of what ought to be private matters. Just as in a small town, where anyone's business is everyone's business, programs in DOS tend to ignore boundaries, poke around in areas originally meant for other purposes, and generally bypass the posted rules. That's fine in a small community, but now that the Apple II series of computers is going big time, it needs more settled boundaries.

The Worst Bottleneck

Disk capacity is the most crucial bottleneck in the older DOS 3.3 route. When DOS was written, no one suspected that an Apple user might ever have megabytes of storage accessible on a desktop. DOS's file structure lets it keep track of slightly more than 100 disk files and of a maximum of a quarter megabyte in any one file. With less than 200 kilobytes on a disk drive, these limits seemed generous.

Apple's own ProFile hard disks can store five megabytes each, however, and outside vendors offer five-inch hard disks with capacities in the scores of megabytes. Some database programs can productively use all the room, and most serious business packages need fast access to large numbers of files.

DOUG PAULIN

Adding the internal record-keeping capacity to keep track of megabytes solves the immediate disk problem, but it doesn't fix the limits on numbers of files. But this problem is one that mainframe and minicomputer designers have spent years on, so Apple was able to adopt some of their solutions.

Rather than keeping a fixed number of positions for the directory entries each file needs, ProDOS allows you to expand from a basic allotment. Instead of keeping every file in a single directory, ProDOS has a main directory that can point to subdirectories, which themselves can have directories beneath them.

Thus, instead of saving space for, say, 1000 files on a hard disk, ProDOS saves space for about 100. If you want to use more files, you open them in subdirectories. ProDOS makes room for directory entries by drawing on the same pool of empty disk blocks that it uses to allocate to programs and data files. If you need the space for directory entries, you get it, but if you don't, it's not wasted.

From the users' point of view, the hierarchical pattern of directory and subdirectory is relatively convenient. Although computers have no problem spotting a specified file in a list of hundreds or thousands, people are not particularly good at that sort of thing. People do better when information is organized in patterns and relations, with major topics, subtopics, and underlying details.

The use of subdirectories lets you organize files in logical groups. Instead of mixing your camping-trip packing list with the house game addict's 200 shoot-the-aliens games, you can put each of these in a separate section. You can make further divisions (school writing projects vs. personal letters within a broad writing category, for example), grouping information by logical category, user, date, or other criteria.

The main drawback of subdirectories, aside from increased complexity of the processing ProDOS has to do, is the necessity for pathnames. If you can store increased numbers of files in more places, you have to go into more detail to describe where they are.

Under DOS, you have only one directory, so you can give a single filename and let the computer find the file you want. It's like being in a small town and saying that a message is for the doctor or the bank or the laundromat. With multiple directories and subdirectories, however, you have to give the Apple more specific location information if you want it to be able to find a file in a reasonable time. Instead of "the gas station," you now say "the gas station over on Third Street in the third block down from Main."

You don't always have to state location information fully—sometimes it can come in part from context. If you meet a man at work who says, "I live at Third and Park," you assume, unless he says otherwise, that he's talking about a corner in your city, state, country, and continent. On the other hand, if he says he comes from Australia, where he lives in Queensland, in South Haven at the corner of Third and Park, you know you can't expect to find him in your current neighborhood.

In ProDOS, the implied assumption about where files are located is called the prefix, and it's normally the name of an overall volume directory and possibly a subdirectory under it. If you give a so-called partial pathname, ProDOS adds the prefix to supply that missing overall location. If you want to refer to a file somewhere else or if you're just

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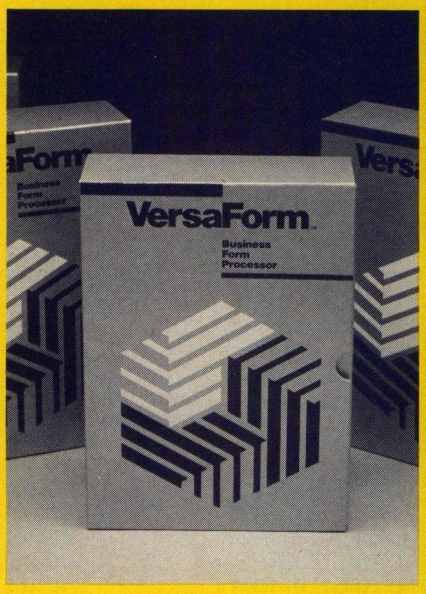

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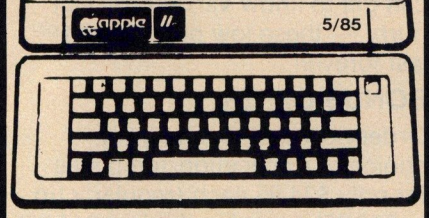

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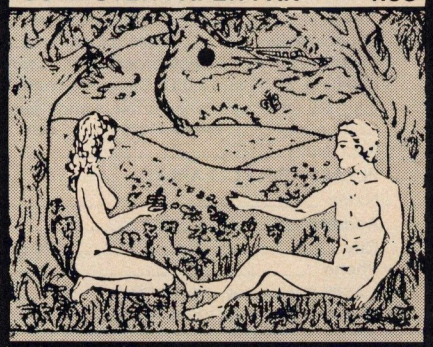

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CIRCLE 265 ON READER SERVICE CARD

trying to avoid any possibility of misunderstanding, you give the full pathname, which includes a prefix that you specify.

If you use only prewritten programs, you may never have to worry about pathnames or subdirectories (which your program may still use internally). If you're writing new applications or hacking away at your own little projects, on the other hand, you'll find that

In ProDOS, Apple defines and guarantees every entry point—like posting signs on a freeway.

pathnames are a minor hassle, but the overall gain in structure and organization makes them worth the slight inconvenience.

Approved Entry Only

Fixing the disk side of the operating system was one major goal Apple set for ProDOS, and fixing the program side was another. Unlike in DOS, where your programs can enter and leave in almost any spot you want, ProDOS makes a serious attempt to insure that your programs enter and leave at clearly defined interchanges.

In a 32K Apple II, every byte of memory counted, so if you could make a DOS routine do double duty, all the better for you. Most serious programmers felt perfectly comfortable wandering through DOS, using pathways that were never intended for external access.

Many older programs expect to find those pathways, which makes changing DOS close to impossible without causing at least some programs to crash into the new structures.

In ProDOS, Apple defines and guarantees every entry point—like posting signs on a freeway. If your program appears at an approved entrance with the right information, you have a promise that it will return at the exit, having completed a certain task. That guarantee is valid even if Apple reroutes or reconstructs ProDOS.

In return, you're asked to stay out of ProDOS's private yard. Apple does not make the ProDOS source code available (though you can get disassembled and annotated versions from several sources). Your programs are expected to respect certain limits.

ProDOS actually offers your pro-

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computer will give you a 413K Appleworks desktop?

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computer runs all Apple software, all CP/M software, has 640K of memory, 4 RAM disks and out performs the IBM P.C.?

ANSWER ON NEXT PAGE . . . .

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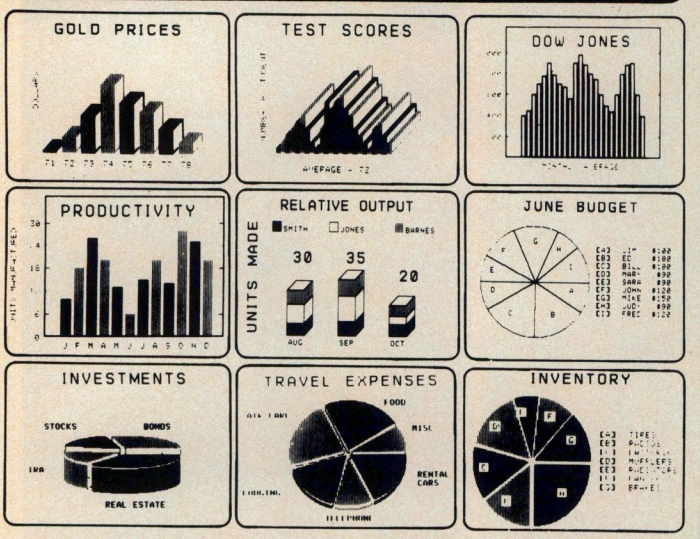

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A **graphics editor,** for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

A **shape table editor,** for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

MasterChart! includes a screen-dump program for printing your charts on paper. MasterChart! is more! Just read what these people have to say about it...

"I noticed the advertisements for Spectral Graphics' Master Chart! program and figured that, with a money-back guarantee, I would try it. Boy, am I glad I did! This is a fantastic program. You can master its many varied capabilities in less time that it would take to describe them. I would recommend it to everyone, even if you have absolutely no need for a graphing program. It's just fun to play with." **S.A. Smith, San Bernadino, Calif... letter to SOFTALK, June, 1984, page 14.**

"The software does much more than the advertisement suggests. Without question, this is among the best buys in software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

"I have long been distressed by the lack of software available in the scientificlacademic community. At last there is a simple yet robust graphics program applicable for our purposes: MasterChart!, by Spectral Graphics Software. Business folks and scientists alike will really appreciate how user-friendly it is; I was able to produce my first three-dimensional, multi-colored, labeled bar graph within five minutes of booting the disk--without reading my documentation. I would have had to pay a scientific illustrator much more than the whole program costs just to produce that one graph....you can't do without this gem." **John B. Iverson, Richmond, Indiana...letter to SOFTALK, April, 1984, page 23.**

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CIRCLE 109 ON READER SERVICE CARD

grams two connected routes to the hardware. The essential part of ProDOS, called the kernel, always stays in memory when ProDOS is in use. A second portion, the BASIC interpreter section, provides an interface by way of Applesoft. For some applications, another intermediary more suited to the task can replace the BASIC interpreter. For example, on the ProDOS users' disk, Filer and Convert are alternative overlayers.

The ProDOS kernel, sometimes called the machine-language interpreter, accepts about two dozen low-level commands, such as those that instruct it to read or write disk blocks or to set and read prefixes. The BASIC interpreter brings its own two dozen commands, most of which are defined at a higher level than the machine-language entry points. Most of the important commands will be covered in "Understanding ProDOS," which starts in this issue on page 26.

If ProDOS discourages tromping through its code for routines, it also takes a formal view on status information. In DOS, if you need to know the state of a hardware signal

You may miss poking around through the code, but remember that for efficiency and safety, freeways always have limited access.

or parameter value, you peek around within DOS to find the value you need. You figure out where you need to look by consulting a table of "magic numbers"—the actual addresses DOS uses to store its working parameters.

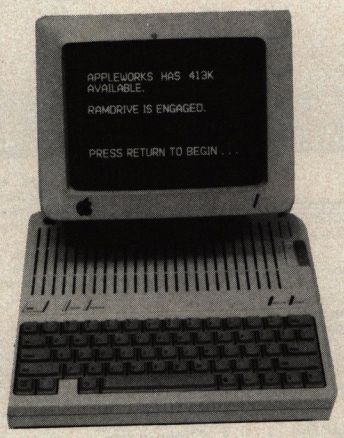
This peeking method works fine, but it does mean that DOS can't change much if you expect programs to find the information they need. Since one byte looks just like another, using absolute addresses is the only way in DOS to locate needed values. In contrast, ProDOS defines a data interface as well as a program-entry point, allowing data values of possible interest to external programs to occupy fixed locations without fixing the absolute location of the internal code.

Do You Need It?

Looking at the greater complexity of its file structure, code interface, and status values, you may say that ProDOS exacts a price in increased structure for its increased power. Consider though, that a high-capacity freeway needs a better foundation than a county road does. You may bemoan all the changes you'll have to make in your disks and programs to make the conversion—often in road construction, the price of moving utilities is higher than the cost of the visible surface. You may miss poking around through the code, but remember that for efficiency and safety, freeways always have limited access.

Because most games are copy-protected and self-booting, you can't transfer them to ProDOS—and don't need to. If a program you want was written for DOS, you don't have to pass it by, but if you're using an Apple II for business, the combination of time-and-date stamping of files, increased portability of data and programs between new models, and the ability to handle hard disks make ProDOS the clear eventual winner. The old ways have their place, but now it's time for a new direction. ✚

The Apple IIc with Z-RAM



Applied Engineering and Apple computer have teamed up to take your IIc to new heights.

Applied Engineering's Z-RAM card for the IIc is available with 256K or 512K of additional memory and a powerful Z-80 microprocessor for running CP/M software.

Z-RAM fits neatly inside the IIc. Installation is easy, clear instructions show you how. You'll need a screwdriver and about 10 minutes (if you can change a light bulb you can install Z-RAM).

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Z-RAM is also a high speed solid state disk drive. With Z-RAM your programs will load and save over 20 times faster. Z-RAM's RAM disk is compatible with Applesoft, Pro-DOS, DOS 3.3, PASCAL and CP/M. And with Z-RAM you can copy a disk in one pass. Just insert the original, remove the original, insert blank disk! That's it! Z-RAM is another disk drive, only 20 times faster, 4 times larger capacity, and no whirring, clicking or waiting!

But before you start panting over all that extra memory, don't forget that the Z-RAM card has a built-in high speed Z-80 processor chip that allows you to run CP/M programs like Wordstar, dBASE II, Turbo PASCAL, Microsoft BASIC, FORTRAN and COBOL and over 3,000 other CP/M programs. So Z-RAM not only makes Apple programs run better and faster, it lets you run MORE programs.

With the Z-RAM card installed, your IIc is still your IIc only now you'll have that extra memory that Appleworks and other programs need. And you can run all that great CP/M software that others can only dream about.

Z-RAM is 100% compatible with all IIc software and hardware including the mouse, 2nd disk, modem and printer. Z-RAM is easily handled by the IIc power supply as power consumption is kept very low by using two custom integrated circuits and a patent pending power saving design. And Z-RAM is from Applied Engineering, the acknowledged leader and innovator of accessories for the Apple.

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So the next time somebody asks you why you didn't get an IBM P.C. tell him you bought a IIc because the IBM didn't have enough memory and was too slow and couldn't run CP/M software. And tell him you made it past the 8th grade.

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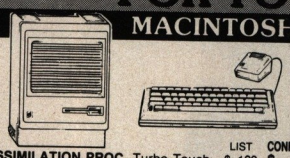

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WORDS TAKE VOICE

▸ APPLEWORDS
BY STEVE ROSENTHAL

A short glossary of terms

ALLOPHONE
One of a set of variations of a single phoneme (basic speech sound). More-sophisticated speech systems allow the selection and construction of allophones to take into account the effects of any preceding or following sounds.

CONTINUOUS SPEECH RECOGNITION
Recognizing words or phrases as they are used in normal speech, without requiring added pauses or breaks between words.

DIGITIZED SPEECH
Speech recreated from an encoded form of the actual sound waves, in contrast to speech synthesized with a circuit that models voice production. Digitized speech can be higher in quality, but it takes a great deal of memory to record it (up to several kilobytes per second of speech).

ENROLL
To provide samples for a speech-recognition system. Since the recognition process is based on matching new inputs to a set of stored templates (patterns), the reference values must first be established. For speaker-dependent systems, each user must go through an enrollment process. Speaker-independent systems use an average of larger groups of people, allowing new users to access the system without going through an enrollment period (albeit usually with less accuracy).

FORMANT
One of the resonances or bands of tonal energy in speech. Speech-output systems that model the workings of the vocal tract generally can produce up to three formants at a time. In speech recognition, the incoming sound may similarly be broken out into dominant tones for matching with stored patterns.

FRICATIVE
The class of speech sounds that consist of pulses of high-frequency noise rather than sounds with particular tones. In most classifications, this group includes the sounds normally spelled with *f*, *s*, *sh*, *th*, and *zh*.

ISOLATED WORD RECOGNITION
The decoding of words or phrases spoken with at least brief pauses between each one. The pauses may be as brief as a tenth of a second or less on most systems, but they are required for most speech-recognition systems in the Apple class.

LEXIGRAPHIC
Pertains to the spelling of individual words. Lexigraphic emphasis, for example, is the stressing of syllables based on the spelling of the word (in contrast to syntactic stress, which takes into account the position of the word in a phrase or sentence).

LINEAR PREDICTIVE CODING (LPC)
A method of producing speech, using a set of parameters to control a system that models the workings of the human vocal tract. Because only the changes in these few parameters must be stored—rather than the detailed sound wave itself—LPC can produce understandable speech with just 500 to 2000 bits per second of speech, which is less than a tenth of that needed to store the complete sound patterns.

LIQUID
The class of sounds that have some tonal value but less than fully voiced patterns. In most classifications, these include *l*, *r*, and *y*.

PHONEME
The simplest sound units that make up human speech. English can be described with about 40 or 50 of these patterns. Most speech synthesizers actually work by translating phonemes into sound patterns, with a prior translation from text to phoneme done either by the software or by the user.

SPEAKER-DEPENDENT
Referring to voice-recognition systems that are set up for use by a particular person, who must first train the system to recognize his or her speech patterns. Speaker-dependent systems can be made more accurate than those intended for general use.

SPEAKER VERIFICATION
The use of voice-recognition systems to confirm the identity of a person, rather than decoding what he or she is saying. The procedure is based on an overall pattern match with a previously stored vocabulary. Proponents claim that voice patterns are as individual as fingerprints and thus are usable for security applications.

SPEECH RECOGNITION
The translation of a vocal input into a corresponding selection or code. In most systems, the user first trains the system (enrollment), creating templates (patterns). A new input utterance (sound) is then routed into a combination of hardware and software that normalizes the rate, extracts features, and then compares the input against the templates. If the similarity measurement is good enough, the input is then considered recognized.

SYNTHETIC SPEECH
Speech based on the translation of input parameters rather than on the replaying of digitized sounds. Synthetic speech needs less memory per second of speech but may not always have equally good sound quality.

TEMPLATE
A stored pattern against which new inputs to a speech-recognition system are tested. Most systems build up a set of patterns during an enrollment procedure and then test new inputs to find which template provides the closest match.

TEXT-TO-SPEECH
A system that produces voice output from a text input. Because English is only a partly logical language, the system is usually based on some hundreds of rules plus a list of exceptions. Larger, more expensive systems use both greater numbers of basic rules and greater numbers of exceptions.

THRESHOLD
How close a new speech input must be to the closest existing templates to be considered a match. Some threshold is necessary to take care of noise or unknown inputs.

UTTERANCE
A phrase or word to be processed by a speech-recognition system. Because the system works on sound patterns rather than on understanding, any utterance may be used for any meaning, as long as it is consistently used.

VOICED
Sounds that have a definite pitch. Most of the vowels are voiced, as are many of the consonants. +

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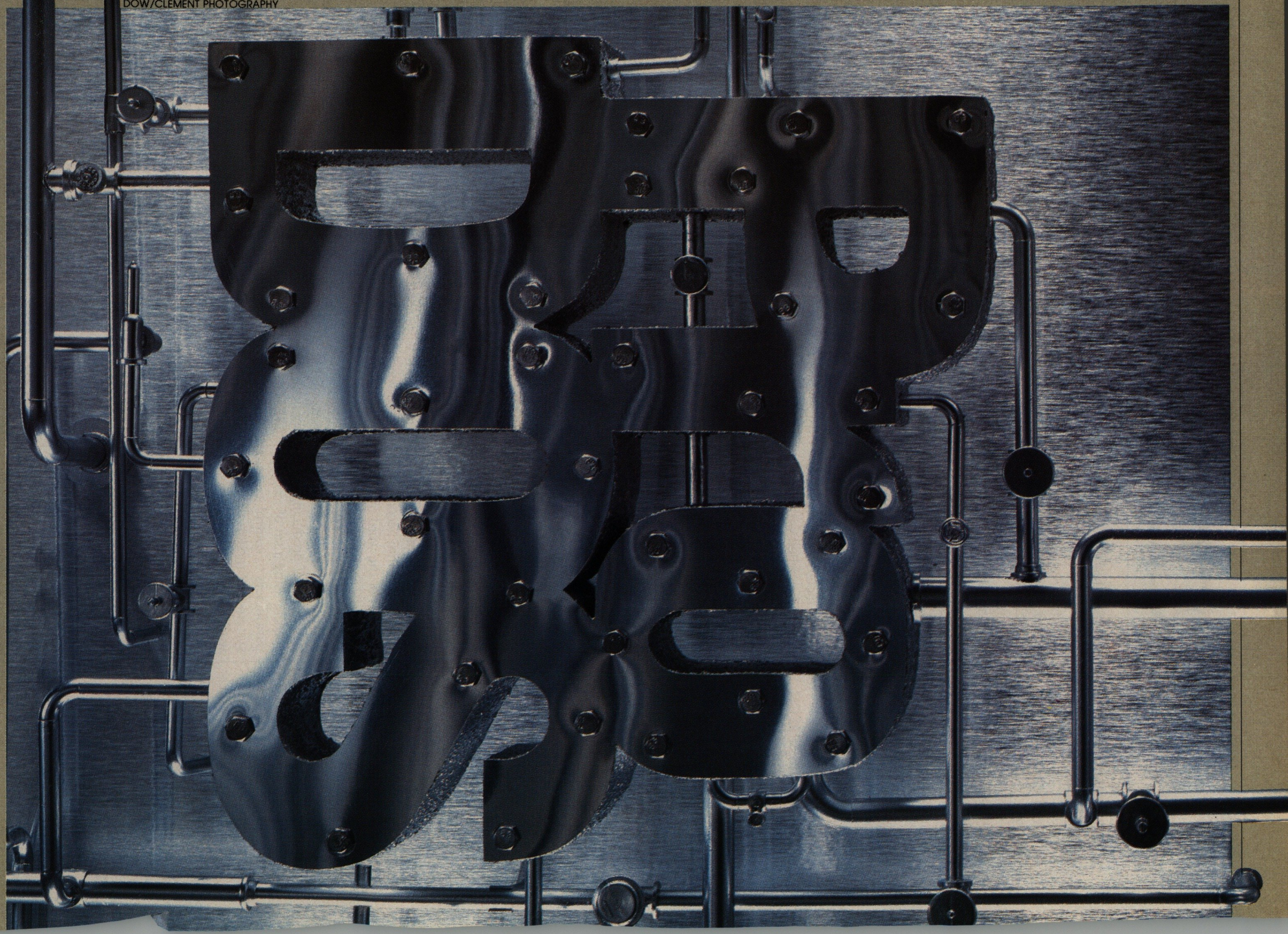

UNDERSTANDING ProDOS

PART ONE THE APPLE II FAMILY HAS KEPT UP WITH CURRENTS IN PERSONAL-COMPUTER TECHNOLOGY THROUGH A CONTINUING SERIES OF EVOLUTIONARY STEPS. ONE OF THE MOST SIGNIFICANT OF THOSE ADAPTATIONS IS THE OPERATING-SYSTEM PROGRAM ProDOS.

BY STEVE ROSENTHAL
AND
KEN KASHMAREK

Almost like an organism adapting to changing ecological conditions, the Apple II family of computers has kept up with currents in personal-computer technology through a continuing series of evolutionary steps. One of the most significant of those adaptations is ProDOS, the operating-system program that Apple now supports as the future standard for Apple II programs.

If you're using only store-bought, self-starting programs on your Apple II, you may not notice the switch to ProDOS at all. If you write any of your own programs, need to format disks, make masters, or want to know something about what goes on inside that sloping case, however, you may benefit from a complete rundown on how ProDOS works and what makes it different from the previous standard, DOS 3.3.

In this discussion, we will examine ProDOS from four perspectives: files, commands, interfaces, and utilities (for an overview of why Apple is switching to ProDOS, see this month's "Thoughtware" column, "ProDOS Renews the Infrastructure," pages 17–22). We'll assume only that you know some simple Applesoft BASIC and a few DOS 3.3 commands—and you might be able to get by even without them.

ProDOS Files

Just like DOS 3.3 and most other operating systems, ProDOS organizes information stored away on a disk in files, which are ordered collections of bytes grouped under an identifying name. Like a file folder that contains individual sheets or long scrolls filled with characters, a file can contain anything that you can store in the Apple's memory.

In DOS 3.3, a single disk directory contains the names and locations of each file on a disk. A disk is presumed to be 143K (143,000) bytes long and is considered full if either the space allocated to files or the space set aside for directory information is entirely in use.

ProDOS has some improved features that let you use high-capacity floppies or hard disks with your computer. Rather than employing the fixed file and disk information DOS uses, ProDOS takes its cue from the characteristics of the hardware.

First, ProDOS divides each storage device into one or more volumes. A volume consists of a main directory, along with a space that you can use to store subsidiary directories and files. Generally, each floppy disk is set up as a single volume, whereas a hard disk might be partitioned into more than one volume. ProDOS can keep track of up to 32 megabytes in each volume, of which a maximum of 16 megabytes can be in any one file.

When you have only one or two disk drives with DOS, telling the computer to look in a certain slot and drive number is a fine way to locate files that you need to access. In ProDOS, on the other hand, each volume has its own directory, and a single disk may contain more than one volume. So instead of using the disk-drive number as the file-location identifier, ProDOS uses the volume name. Thus, ProDOS programs need not be tied to a specific drive or slot—if a program describes a file it needs by volume name, ProDOS can retrieve it, regardless of which drive it is on or whether it is on a floppy or a hard disk.

In a ProDOS volume, which, you'll recall, can be up to 32 megabytes long, you can store as many as a thousand different files. So that you and the computer don't have to look through all the directory entries every time you want to find a file, ProDOS allows you to divide up each volume by creating one or more subdirectories. In this system, you can put certain files in each subdirectory and look in that one place alone when you want a file of that type.

For example, if you generally keep all your files on a hard disk, you may have all of your AppleWorks programs and files within one subdirectory; you can put all your games in another subdirectory (at least those that run with ProDOS, since many older games still require DOS 3.3); and in a third, you can put your financial and checkbook programs. When you have to get ahold of your file about, say, budget forecasts, you need look no further than the AppleWorks category. If you have lots of forecasts, you can even create a subdirectory within the subdirectory, for forecasts from a certain month and year.

This capability to divide the total file space into volumes, each volume further into subdirectories, and the subdirectories still further into subsubdirectories results in a "hierarchical" or "tree-shaped" file structure. A tree in the computer world grows upside down,

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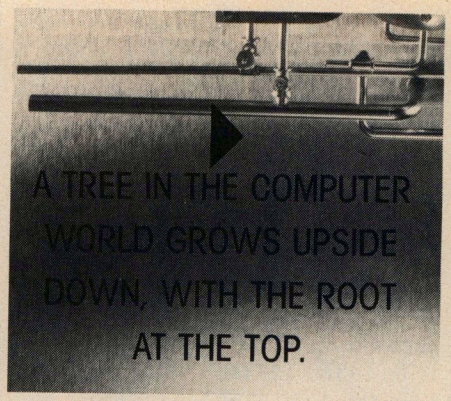

with the central root at the top, various branches below, and individual leaves coming off the branches. In ProDOS, the volume is the root, each subdirectory is a branch, and each file is a leaf. Note that ProDOS trees don't have to be perfectly trimmed—you can have individual leaves (files) growing right out of the root (the main volume directory) as well as on branches (subdirectories).

To tell ProDOS how to find a file, you specify which volume it should look in and, if the file is part of a subdirectory, which subdirectory. The file specification, in fact, is the path you take down the tree starting at the root (the main volume directory) to the leaf (the file). You start with a / for the root, then the volume name, and then down through the tree as necessary with a / setting off each level. For example, the pathname for your favorite editor program might be /MYVOLUME/HIT-PROGRAMS/EDITOR.

Since one of the purposes of the tree structure is to allow you to group related files together, it's not surprising that the files you access during a ProDOS session are often all in the same branch or subbranch of the tree. ProDOS allows you to specify a default-reference starting point and then specify only the path you need from there. This new starting point, which acts as if you had typed it in before each file specification, is called a prefix, and the relative path is called a partial pathname.

As an example, if the prefix is /LOOKHERE/FIRST and the file specification you give is MYFILE, the system will look in the volume LOOKHERE for a subdirectory named FIRST and in that directory for a file named MYFILE.

You set the current prefix in ProDOS with the Prefix command. You can also record prefixes on ProDOS system disks, and they will act as the default value when you use the system disk to boot the computer. If you want to use a file without referencing the current prefix, you use a full pathname, which starts with a / and the name of the root volume directory.

In theory, a prefix or path can be as long or complex as you like, with one limitation: a full pathname, prefix, or partial pathname can contain no more than 64 characters. In practice, you'll find one or two levels of branching (subdirectories or sub-subdirectories) sufficient for normal applications.

New File Types

Not only does ProDOS have a more sophisticated way of describing where to find a file than DOS does, but it also has more types of files to find. An invisible byte in each directory entry labels each file with one of 255 possible file types. Only about a dozen of these are defined so far, another dozen or so provide compatibility with the SOS operating system on the Apple III, and eight values are available for user definition.

The dozen common file types and the 240+ other possibilities are another factor that lets ProDOS concentrate on files that may be relevant in a particular situation and temporarily ignore the rest. This capability comes into play mostly for selecting only the appropriate values for menu displays or processing and for providing error-specific types of error checking.

In terms of the external file form, rather than its contents, ProDOS looks at all fields as being in one of three classes, depending on file size. In an analogy somewhat like that of directory paths, the classes are "seedling," "sapling," and "tree."

A seedling file has 512 bytes or less and is stored in a single logical block. The pointer in the directory entry that tells ProDOS where on the disk the file is stored can point right to that single data block. In the tree analogy, it has only a single root or main stem.

A sapling file consists of 513 bytes to

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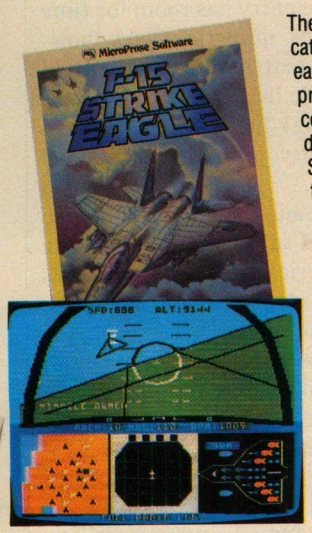

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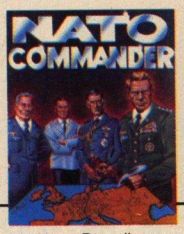

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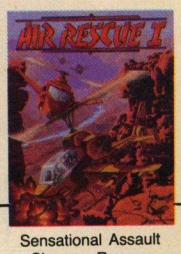

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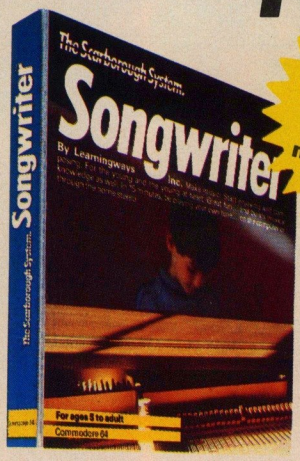

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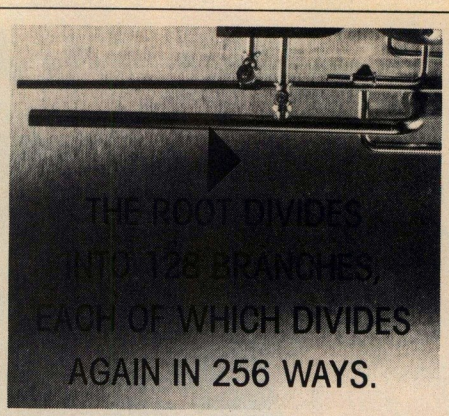


128K bytes and takes 2 to 256 logical blocks to store away. This time, the pointer in the directory leads ProDOS to an index block that, in turn, contains up to 256 pointers to the file-data blocks. ProDOS takes this route because the directory entry itself has room for only a single pointer. This way, ProDOS grabs the necessary extra pointer space by using a block in the data area of the disk. In botanical terms, the root here leads to a stem that can have up to 256 branches.

A full tree file holds between 128K and 16 megabytes. The directory entry points to a first-level index block that, in turn, points to a maximum of 128 second-level blocks. Each second-level block can point to as many as 256 logical data blocks. In the tree analogy, the root divides into 128 branches, each of which divides again in 256 ways at most.

Bytes about Files

The ProDOS directory isn't content to record just the filename, file type, and a pointer to a file's location. In addition, each file entry has room for time and date stamps, numeric values showing when you created and last modified the file. These values can appear on directory (catalog) listings and come in handy for utility programs or special applications.

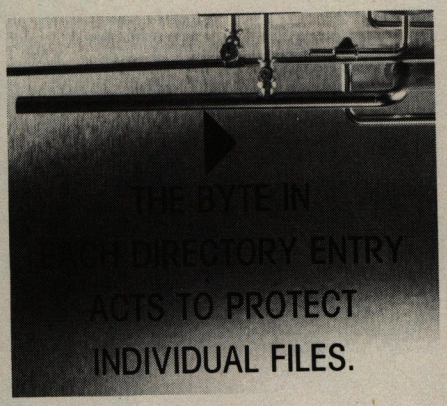
Two version-number fields comprise a more unusual set of values. Each file in ProDOS carries a byte that specifies which version of ProDOS created the file and the minimum version you need to use it. Thus, five years from now, your Apple will be able to find out if a file you created in 1985 is still usable and, conversely, whether your old ProDOS can run an application you created at that later time.

The access byte is more familiar. This byte in each directory entry acts to protect individual files, much like the locked function in DOS 3.3 does. In ProDOS the protection is slightly more

sophisticated, however. Separate bits specify whether you can read, write to, rename, or destroy the file and whether the file has been changed since the last time you backed it up. You can mark a file for Read-Only, Read and Write But Not Erase, and even Rename But Not Read or Write.

The directory has fields for the file length, expressed in ProDOS in terms of logical storage blocks used, as well as of the number of bytes in the total length. For files that need addresses or record lengths (such as BIN files stored as memory images or TXT files with random record access), an auxiliary type-dependent field keeps track of that value.

ProDOS text files have one more significant change from their DOS counterparts. In DOS, normal text is stored with the high bit of every character set



to a 1, but in ProDOS, the high bit is normally set to a 0, which brings ProDOS files into conformance with the arrangement most external devices use. In the early days of the Apple II, setting the bit high made life easier for some of the hardware and program code, but now, at a time when computers are increasingly interconnected, it makes more sense to adhere to the standard.

That's it for this installment of the ProDOS tutorial. Now that we know a little about ProDOS files, it's time to put them to work. Next time, we'll discuss the ProDOS commands. ✚

Ken Kashmarek, who lives in Iowa, has 20 years' experience in computing. He is currently a senior performance analyst at the Deere & Company Corporate Computer Utility. Steve Rosenthal is a Berkeley, California, writer and lexicographer who tries to maintain a perspective on other joys and problems in the world besides those involving personal computers.

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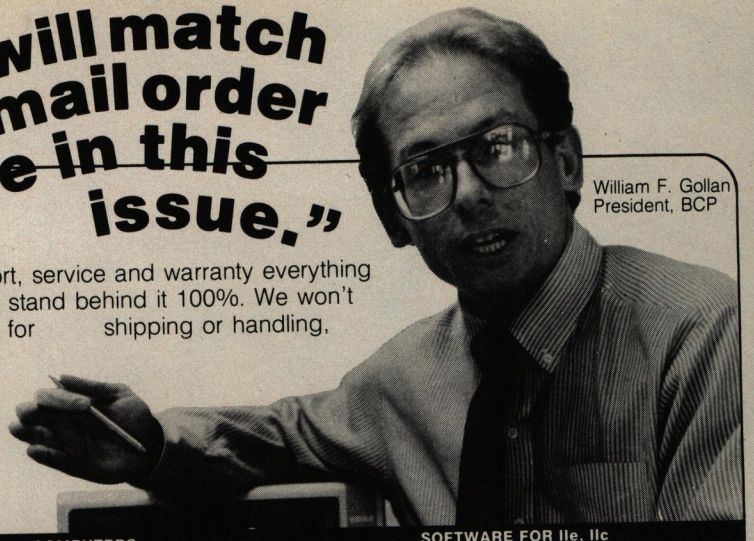

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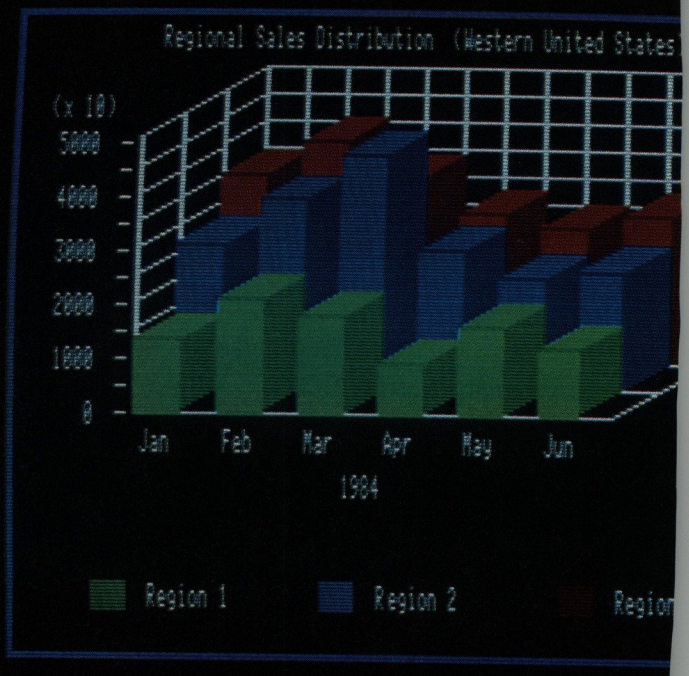
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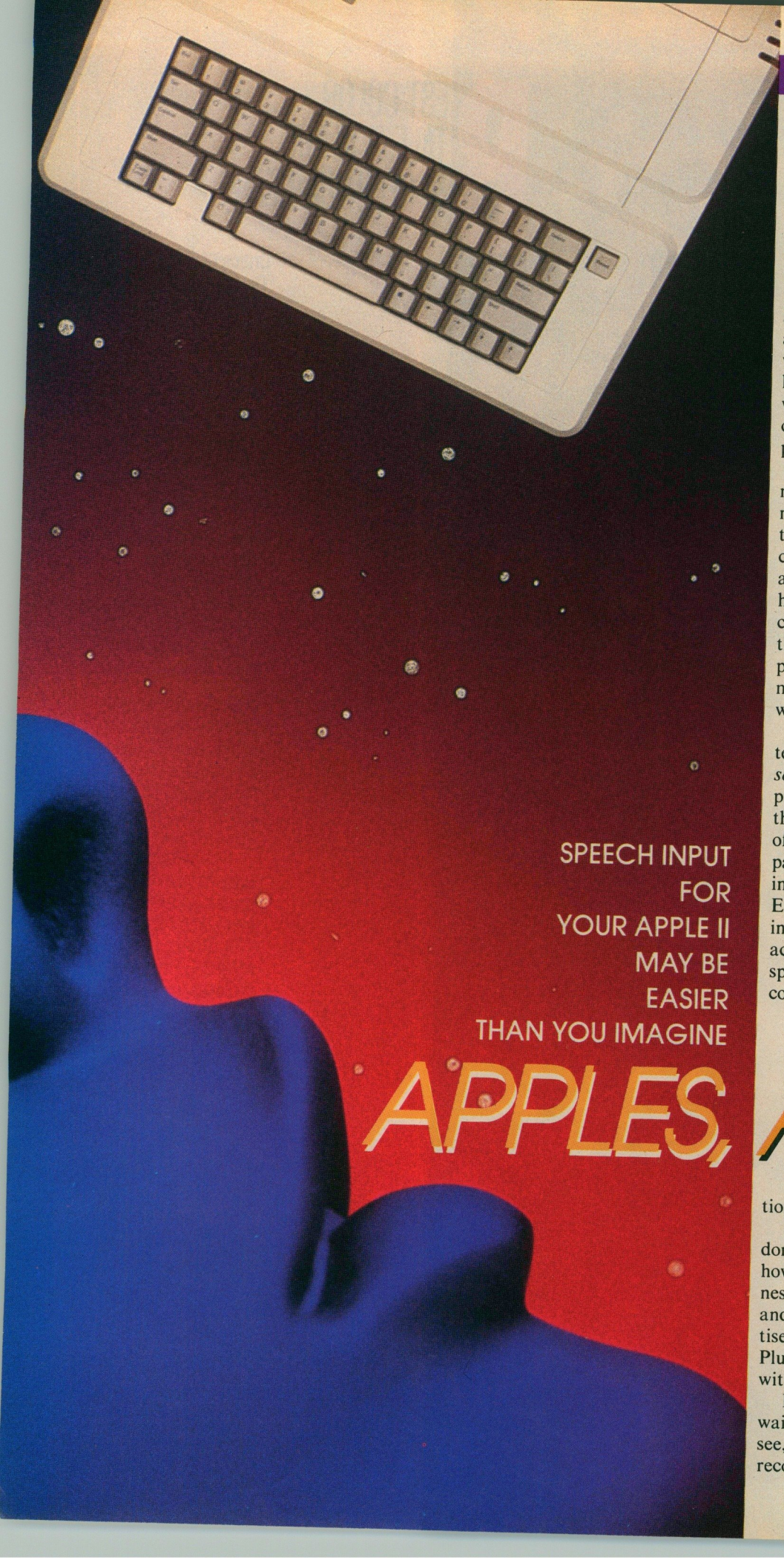

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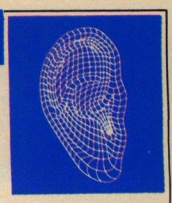
Talking to your computer isn't a sign of mental disturbance if your machine is equipped with a speech-recognition system. These combinations of hardware and software let your Apple II identify and respond to certain prerehearsed words or phrases. The computer doesn't know what you say, nor does it care what you mean—but it will translate a consistent vocal pattern into a stored pattern of keystrokes.

On the personal level, speech recognition allows people who cannot or will not use a keyboard to give commands to their Apple through a microphone. In commercial and industrial settings, it allows people who need to keep their hands on their work to enter data into a computer. In educational use, it enables the computer to help with oral drill and practice. For experimenters, it's one more way to see how much you can do with a desktop computer system.

At this stage in personal-computer technology, speech recognition is really *sound* recognition. All of the available products for the Apple work by finding the closest match for the sound pattern of your command among a group of patterns you've previously created during a learning session (see "Electronic-Ear Technology," page 38). Artificial-intelligence (AI) techniques that actually consider the content of the speech in any but the most restricted context are still to be found only in fiction and experimental labs.

You don't need a great deal of wisdom in a speech board to make it work, however. With some patience, a willingness to poke around inside your Apple, and some help or some computer expertise, you can have your Apple II, II Plus, or IIe listening to your words within one evening.

If you're a IIc user, you may have to wait a bit for a good solution. As you'll see, it's a lot easier to integrate voice recognition into a machine with slots



LEND ME YOUR EARS

and an accessible circuit board. You can buy stand-alone voice-recognition units, but the cost might be comparable to what you paid for your computer. Considering the increasing numbers of IIc's and the interest in voice communication, however, products tailored for the IIc should soon start to appear.

Plugging in the Hardware

Rather than have you completely rewrite all your programs for audio input, most voice-input vendors have designed their boards to simulate the operation of the keyboard. Some boards, such as the Micromint Lis'ner 1000, do this with software. Others, such as The Voice Connection's IntroVoice, actually supply the electronic pulses that your Apple expects from the keyboard.

Even the more hardware-oriented approaches need a good bit of software to set up the voice-recognition system, but the software-based systems need their instructions both during setup and during use. Thus, although the hardware solutions operate with applications written under DOS, ProDOS, CP/M, Pascal, or whatever, the software solutions are limited to a single operating system (usually DOS).

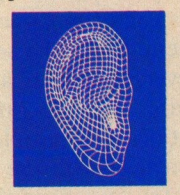
Naturally, hardware installation is much easier if you use the software-linking approach. With the Lis'ner 1000, you plug it into slot 4 (or any other slot if you want to adapt the software) and route the microphone cable out the back. With The Voice Connection's IntroVoice, however, you have to remove four chips from their sockets on the Apple motherboard, plug them into the IntroVoice card, connect the card to the motherboard with three jumper cables, and then plug the card into slot 4.

If you're working in a busy office or industrial setting, you'll need to use a headset-style microphone, which most products offer as standard equipment. If you work in a quiet environment, you may be able to take advantage of the better fidelity of a good desktop microphone (an option for the IntroVoice products).

Then Comes the Software

The speech-recognition software gives you the chance to teach the board the sound of your voice, to select a vocabulary, and to tell the system what you want the Apple to do when it recognizes one of your phrases. The quality, ease of use, and effectiveness of the software varies greatly among speech-system vendors.

Speech-recognition systems for the Apple are generally limited to isolated word-dependent and speaker-dependent technologies (see "How to Talk to an Apple," page 36). Thus, before a board can attempt to recognize your vocal commands, you must first go through a brief training period during which you speak into the system the words you'll want to use.



With some patience and a willingness to poke around, you can have your Apple listening in one evening.

At any level of technology, vocabulary size and accuracy represent a trade-off. Because the systems reduce the sound to a string of numbers, the more words to be stored, the fewer the digits the system can allocate to each utterance. Because the system looks for the closest match, large vocabularies usually result in several close choices.

One tactic that all voice-recognition systems use is to format their word lists into separate vocabularies. When you want to use AppleWorks, for instance, you load into the system your disk of AppleWorks sound patterns. The system then has to find only the closest match in that context, rather than also checking for matches with VisiCalc terminology.

Typically, an on-line vocabulary comprises half a dozen to a hundred words. For even better control, the Micromint Lis'ner, for example, lets you specify subclasses and requires that words from one subclass occur immediately after another defined class.

Once you've selected your vocabulary, you tell the computer what you want it to do in response to the word or phrase, in much the same way that you set up keyboard macros. You tell the system what keystrokes to send to your program for each phrase in your vocabulary. For example, if you're creating a vocabulary for DOS, you might specify that the system respond with C-A-T-A-L-O-G <return> when you say the word *catalog*.

Note that you can match any keystrokes with any phrase, so you can just as well train the system to output DIR <return> for your CP/M programs or even respond with either of these commands when you say "Files, please." The vocabulary word or phrase is merely a guide for your use in associating sounds with keystroke patterns.

The next step is to "enroll" your voice patterns. Some of the more simple software asks that you repeat each word or phrase you want to use a set number of times. More often, the software keeps track of how consistently you speak and has you repeat the word only enough times to establish a sufficiently accurate pattern. Normally, the software also has a test mode, so you can see how well it recognizes your inputs before you save the patterns on disk.

On hardware-oriented systems, you're now ready to go. With the sound

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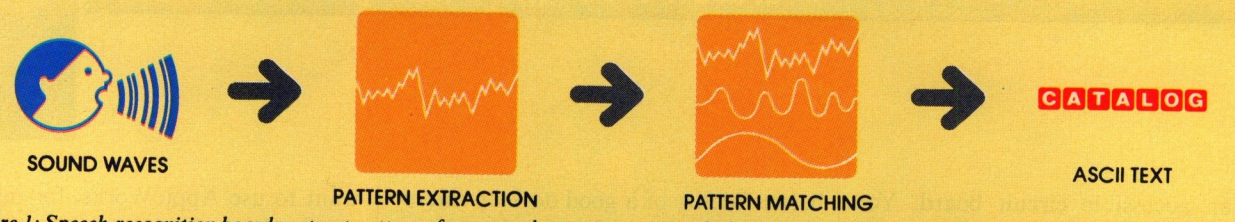

Figure 1: Speech-recognition boards extract patterns from sound-wave inputs, match the patterns against stored templates, and produce characters equivalent to the keystrokes that correspond to the word or phrase best matching the sound-wave inputs.

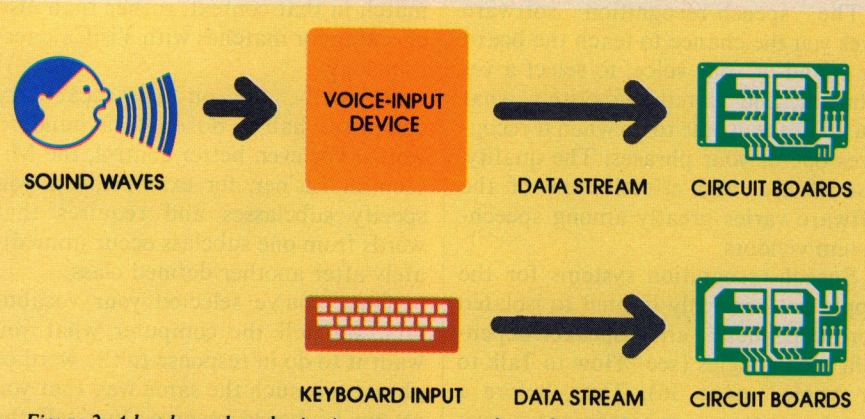

Figure 2: A hardware-based voice-input system simulates the signals sent by the keyboard input circuitry to the rest of the main circuit board.

patterns and keystrokes stored away, you can boot up your application program and run it. Whenever the system expects a keyboard entry and you have a vocal equivalent in storage, you speak your phrase instead. On-screen, you see the stored keystroke patterns appear, as if an invisible hand were entering them; your software doesn't know the difference, though, and it's off and working.

The software-oriented systems work almost the same way, but you do have to go through an additional step each time. With the hardware systems, you simply load your phrase and run your applications each time, once you've set up the system. With the software systems, however, you must also link the voice software to the operating system. This operation is a simple, two-step, menu-driven task with the Lis'ner, for example, but it does mean that the software takes up some of your system's memory and makes certain changes to DOS. If you've already nearly hacked your DOS to pieces, or if you use other programs that make DOS changes (including some copy-protected games),

HOW TO TALK TO AN APPLE

Recognition is the key word in voice recognition. The success of these systems depends on their being able to match your voice input against your previous recitation of a word or phrase. So it's important that you say your vocabulary in the same way during the training phase as during actual use. If you're normally somewhat of a mumbler, enunciating clearly during the training part may be admirable—but it won't work if you don't speak that way when you use the result. And because of the variation between voice and speech patterns, you probably won't be able to use the vocabulary recorded by a friend or family member, even though everyone says they sound exactly like you.

Furthermore, voices change in response to illness, stress, or perceived audience. If you're having a particularly bad—or good—day, if you get a cold or have a fever blister on your lip, you may have to retrain the system to accept your voice.

WHAT CAN YOU DO WITH A VOICE RECOGNIZER?

Imagine you're examining cell cultures under a microscope. Rather than look away, pick up your pen, refocus your eyes, and write down what you see, you call out to your Apple the sample number and your findings. You might want voice output as well for confirmation, but just being free of the keyboard or pencil is a productivity booster.

Voice recognition's biggest market, so far, is in this kind of inspection, inventory, and data-entry operation. If you need to enter data but your hands are already busy, voice recognition can let you keep your hands on your work.

For ordinary business software, voice recognition lets you pull up data from your system with a vocal command, which lets you make notes, do other work, or even type results into another computer. In the case of word-processing or spreadsheet software, you can use the voice commands for cursor positioning and keep your hands on the keys.

In education, voice input can supplement the teacher's attention for oral drill and practice. For example, Chatterbox from Voice Learning Systems allows an Apple to supply the thousands of repetitions that a learning-disabled child might need to learn to read a new word. Because it asks the child to speak out loud only the word shown on the screen, it can be used with children who cannot type or even select regions on a touchpad.

At current prices, voice input for games is somewhat of a luxury item. If you're a game fanatic, you might want to pay the price. Be sure to look into compatibility issues before you buy, however.

Last, and perhaps more important, voice input can open up the world of computers to people with sufficiently impaired mobility that they are not able to use a keyboard. Through the computer, they can control other devices, increasing the activities they can do independently.

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you may at times find some software conflicts.

Chips Are the Key

As with most specialized computer functions these days, the key to most voice-recognition products is a voice-recognition chip. Now that a mass market is developing for voice recognition in home appliances and electronics, many of the major semiconductor houses have voice chips either out or in the works.

As with other computer functions, voice chips themselves are becoming increasingly sophisticated and doing more of the job in a single piece of silicon. For example, the General Instrument SP 1000, used in Micromint's Lis'ner 1000, not only converts the incoming sound wave into a matrix of values reflecting the essential features of the utterance, but it also controls the levels on the input amplifiers for automatic gain control, runs the analog-to-digital converter chips that change the sound waves to digital bits, and accepts replies for the system processor for audio output.

The key to most voice-recognition products is a voice-recognition chip.

You won't have to worry about the chip level if you don't want to; the boards I tested automatically set all the needed chip parameters with their included software. If you're a true hacker, though, you may want to work down at the chip level as well.

More Programs

Should voice recognition become more popular, we will probably see an increasing number of programs that offer voice options. Right now, most software specifically written for voice involves inventory, education, and specialized business applications (see "What Can You Do with a Voice Recognizer?" page 36). Who knows, it may be an *A+* reader, such as you, who delivers the voice-based software that will make the rest of us all sit up and listen. ✚

Steve Rosenthal is a lexicographer, writer, TV producer, and bicycle rider who writes regularly for A+.

ELECTRONIC-EAR TECHNOLOGY

Several million years of evolution have gone into programming our ability to recognize spoken words. Computers, still lagging far behind, use a fairly primitive aural technology.

The immediate object during the data-capture phase is to turn the speech input into a small but representative pattern of data values. In general, this process is called feature extraction.

In the early days of speech recognition, a system applied the microphone's analog signal, representing the soundwaves, to a leveling amplifier and then routed the signal through a series of filters tuned to different frequency (pitch) bands. Sampling the filter outputs at regular intervals in digital form created a matrix of values, which then became either a reference template or a value to check against existing entries.

Conceptually, most voice systems go through a similar process, but instead of actually breaking down the signal into frequency bands through circuitry, the process is now accomplished electronically by mathematical transformations. Some speech systems still use frequency bands, but others cast the results in terms of the parameters that a linear-predictive-coding (LPC) speech-output chip would need to produce the same sound pattern.

Unfortunately, people do not say the same words the same way each time they speak. Finding out which part of a phrase to compare, when to start, and how to make the comparison is the central element in the art and science of voice-system design. Requiring isolated word input from the user takes care of the selection part (and that's why phrases must be run together as if they were a single word), but many challenges still remain. Because words are sampled over a period of time, for example, each input must be normalized to the same time base to take into account variations in the rate at which the user speaks the word.

To further lessen the effect of minute variations, during the initial training period the software collects enough samples to form average values for each phrase or word. The average values then become the templates against which new inputs are compared. Comparison takes place by selection of the best match and comparison of the closeness of the match to a programmed minimum-acceptance level.

Making the comparison is a function currently in flux. Older systems rely on software operations in the host system to compute an index value for the closeness between the current input and existing templates. Newer systems use special comparison chips, allowing faster results and putting less demand on the host system's resources.

▶ PRODUCT INFORMATION

Lis'ner 1000
The Micromint, Inc.
25 Terrace Drive
Vernon, CT 06066
(800) 635-3355
List Price: $189 and up
CIRCLE 490 ON READER SERVICE CARD

IntroVoice I and II
The Voice Connection
17835 Sky Park Circle, Suite C
Irvine, CA 92714
(714) 261-2366
List Price: IntroVoice I, $595–795; IntroVoice II, $795–995
CIRCLE 491 ON READER SERVICE CARD

Voice-Driver
(Repackaged version of IntroVoice I and II)
Voice Recognition Systems
550 Battery Street, Suite 1716
San Francisco, CA 94111
(415) 788-2007
List Price: $995
CIRCLE 492 ON READER SERVICE CARD

Chatterbox
(special-education software, requires Echo+ [see "Season'd with a Gracious Voice," pages 40–44] and IntroVoice)
Voice Learning Systems
29 Elk Ridge Lane, Dept. B
Boulder, CO 80302
Nationwide (800) 531-5314, Texas (800) 292-5619, Hawaii or Alaska (800) 821-0728
List Price: $295 and up; with Echo+ and IntroVoice 1, $995
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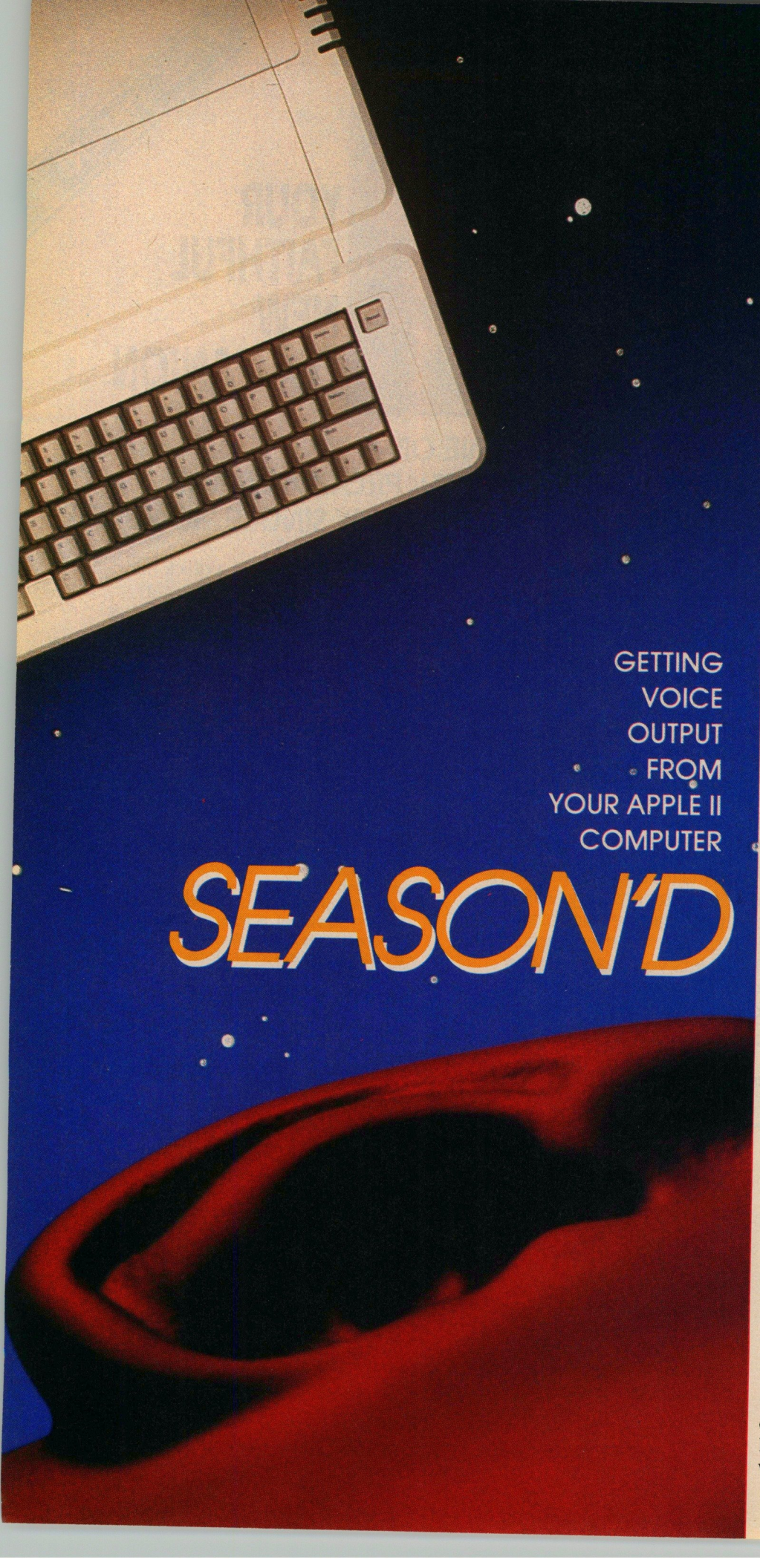


GETTING VOICE OUTPUT FROM YOUR APPLE II COMPUTER

SEASON'D WITH A

To hear an Apple II speak its first phrases may not have quite the emotional impact that hearing a child's first halting words has, but in both cases the power of speech opens up new frontiers of communication. With the right hardware and software, an Apple can speak out loud, reciting text files, programs, and numeric values.

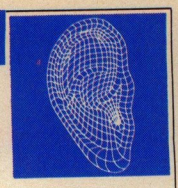
Speech output makes computer use possible for people who cannot read a video screen. It helps in applications where a sighted user cannot look at the monitor. Oral cues can reinforce educational programs; words, and even songs, can be added to games; and, for many people, making the computer speak becomes a fascinating project in itself.

Every Apple II-series computer comes equipped to make simple musical sounds, but its tiny speaker and output circuitry were not designed for the demands of spoken output. Adding speech to the computer means adding hardware, usually a card that plugs into an Apple II, II Plus, or IIe. For the Apple IIc, or for the other models equipped with a serial card, several speech devices exist that link up to the Apple with a serial connection.

Good News and Bad News

To see how practical speech has become on the Apple II, I looked at a sample of available products. In general, each package included the speech-output hardware, software for creating and editing sound codes, and a program for translating text in the computer to spoken words.

The good news about voice boards for the Apple computer is that you can buy a number of boards and boxes that will produce understandable output, even from normal text. None of the products sound completely human, and for best sound quality you need to edit the input text with all sorts of special codes. For most text, though, if you have some idea of the context and the vocabulary, it is not difficult at all to



follow the audio output.

The bad news is that you have to be somewhat of a hacker, or very patient and determined, to make sense of these products. Of the half-dozen speech products that I looked at, not a single one had a manual that was clear, accurate, and complete. Most products, in fact, assume that you're an accomplished Applesoft-BASIC programmer, ready to PEEK and POKE your way through memory. That's fine if you're an experimenter at heart, but if you're only a computer user, you may need some help from your dealer, a friend, or a paid expert.

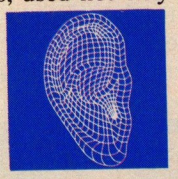
A good way to start looking at speech boards is to determine how they plug in. Some products, such as Street Electronic's Echo+ or Don't Ask Software's S.A.M., plug into an Apple II, II Plus, or IIe just like any other peripheral card does. Electrically, the cards will go in any slot, but if you want to use the provided software, you have to select the slot it specifies—which in most cases is slot 4.

If you have a IIc model, or you can't spare the slot, or you'd rather use a serial card and keep the cover closed on your Apple, several firms make speech-output units with serial connections. Votrax's Type 'N Talk and Personal Speech System and the Intex-Talker are all in this class. Naturally, these units tend to be more expensive because they need a case and power supply as well as a circuit board.

Another approach to making sense out of the various speech systems is to look at the hardware technology. Speech boards use a number of different technologies (see "The Dialects of Speech Output" on page 42), usually embodied in a speech-output chip. A better chip means more understandable speech, with lower memory-storage requirements.

The S.A.M. board is an exception to this pattern. As its full name, Software Automated Mouth, indicates, it is basically a software system (and on several other brands of computers it uses only the computer's built-in hardware). Instead of a special speech chip, S.A.M. does all the speech processing in software, leaving only the conversion from digital form to the electrical waves needed for sound, as a task for the hardware. In my listening tests, the resulting quality was surprisingly good.

The SC-01 chip from Votrax has been one of the more popular speech-output chips, used not only in Votrax's own Type 'N Talk and Personal Speech System, but also in the Intex Talker. Apparently, you can expect usable, but not outstanding, sound quality from a system based on the SC-01.



With the right hardware and software, an Apple II-series computer can speak out loud.

GRACIOUS VOICE

Several successors to the SC-01 seemed to do a better job. The SSI-263 appears to be the current favorite, used in the Sweet Microsystem Mockingboard and the Micromint Sweettalker II. Speech produced by this chip is reasonably understandable. Unbelievably enough, this chip also adds musical tones to words, on command, letting boards that use this chip literally sing.

The TMS 5520, used in the Echo Cricket and the MultiTech SSB-Apple, also seems to do a creditable job. This chip comes from the same people who developed the Speak 'N Spell toy, so they've had a lot of experience in speech development.

The speech chip or data converter determines only how good the speech quality is if you send the chip codes for the right sounds. In normal use, however, you want merely to send English text to the speech system, rather than painstakingly translating what you want to say into sound codes. We'd like the computer to do any needed translations from text to code values.

Unfortunately, figuring out how to pronounce the English language is somewhat of an inexact science. Although some general rules work for most words and phrases, an endless number of exceptions seems to exist. Even the computer, as it turns out, can't keep track of all the possibilities.

All of the units I looked at came with text-to-sound-code software. Normally, this software consisted of some dozens or hundreds of general-pronunciation rules, with the hooks needed to link the software to Applesoft, routines for direct entry of text for oral output, and a demonstration or two. The exception was the two Votrax units, which had their software built in.

If you're willing to live with some strange-sounding locutions, you can accept what you get from this automated translation process with no further efforts. Once you've linked the software to Applesoft, you can output text almost as if you were sending it to the printer. If that's not good enough for you, however, all of the boards have provisions to let you overrule what would otherwise be the result.

The easiest method to change the way the word gets pronounced is to change the spelling. If you want to make sure that the system says the name of the language correctly, spell it *Inglish* rather than *English*. Similarly, say you *red a book yester day* and found what was *allouwed*.

If you want to go further, the Echo+, for example, lets you change the pronunciation rules. All of the

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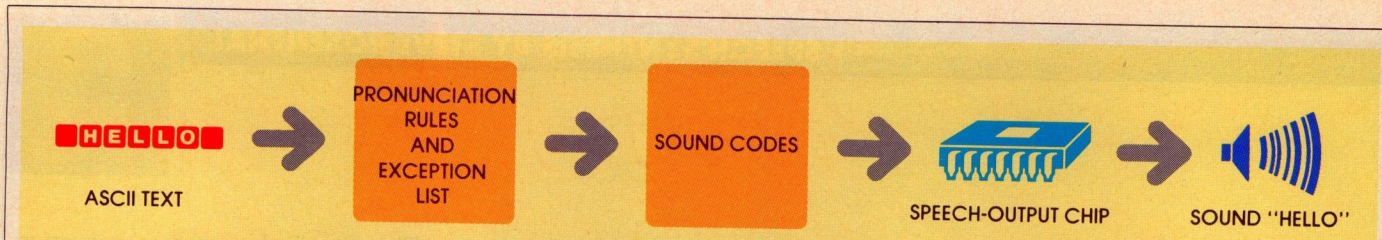


Figure 1: A speech-output system turns text into sound codes, which drive a speech-output chip to produce the appropriate sound waves.

boards let you enter text as phonemes, and some, such as the Votrax Personal Speech System, let you enter a list of exceptions to be pronounced as specified instead of by the rules.

Voices

Should you be planning to use a voice board to add speech to an existing application, note that even when the speech programs integrate with Applesoft, they still require added memory and disk space. You may have problems with protected software, which generally cannot run with other programs in memory and is often not very graceful about sharing disks.

To add a voice for the use of a visually impaired person, remember that most existing programs, particularly word processors, rewrite the same information quite frequently. It's worth the trouble to get a program specifically designed for oral use.

Learning from Experience

In researching this article, a friend and I spent a lot of time plugging in various speech boards and seeing what we could get them to do. Here's a selection from some of our notes.

S.A.M. Board

The S.A.M. board wasn't hard to install, but it ended in stripped wires rather than a speaker jack. The board itself was a tiny bit oversized, so we had a lot of trouble getting it back out of slot 4. The manual was easy to read if you knew Applesoft, a bit mysterious otherwise. We liked the liberal use of examples and had no problem making the board pronounce the words of text files and programs. Voice quality was good, with enough inflection to keep it from sounding oppressive.

Echo+

The Echo+ uses ProDOS for its software, and it assumes you know how to back up disks and otherwise run ProDOS functions. The manual seems intended more for assembly-language hackers than for casual users. If you want to use the female voice, which seems to speak with more clarity and inflection, you have to have an Extended 80-Column Card; otherwise you're limited to the more mechanical-sounding male voice. This board also plays musical tones and sound effects. If you ever need to simulate a train going through your living room, you can ask the Echo+ to do it between recitations.

SSB-Apple

SSB-Apple assumes the board is in slot 2 rather than slot 4. Because this system uses preencoded words, you have to swap the four vocabulary disks back and forth to build up your sentences. You can save the "compiled" sentences to disk. Again, this manual is more for dedicated users, having no in-

THE DIALECTS OF SPEECH OUTPUT

Three techniques for producing speech output account for almost all current designs. One, called linear predictive coding (LPC) models the way the human voice actually works. The other two store and reproduce speech based on the waveforms of the component sounds.

With linear predictive coding, a set of sound generators creates initial tones, much like the resonating of the human vocal chords and the rushing sounds of air. Next, these initial sounds pass through a set of filters that shape the sounds further, in much the way that the tongue, lips, and teeth modify sounds in human speech.

It takes many fewer bits to specify the sound generators and filter positions than it does to record the actual soundwaves, so LPC lets an Apple speak for longer periods, using fewer bits of storage. There's a slight cost in speech quality, unfortunately, because the modeling of the speech process is not perfect, and the parameters don't cover all the fine gradations. LPC requires between 400 and 2000 bits per second of speech.

When speech must be recorded for playback, or as an alternative to LPC for synthesizing messages, another popular choice is digitized speech using CVSD. This method does record sound waves rather than throat positions, but it saves memory space by encoding only voice changes. It offers higher-quality output than LPC does, but only at greater numbers of bits per second.

For the ultimate in simplicity and quality, actual sound waveforms can be converted to digital codes, stored, and replayed. This requires some 3000 to 20,000 bytes for each second of speech—far more than is practical for general personal-computer applications.

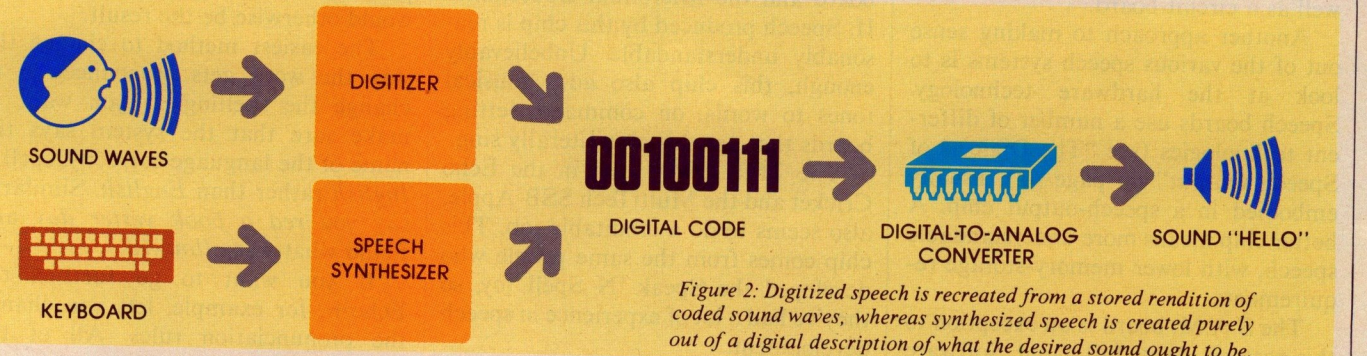
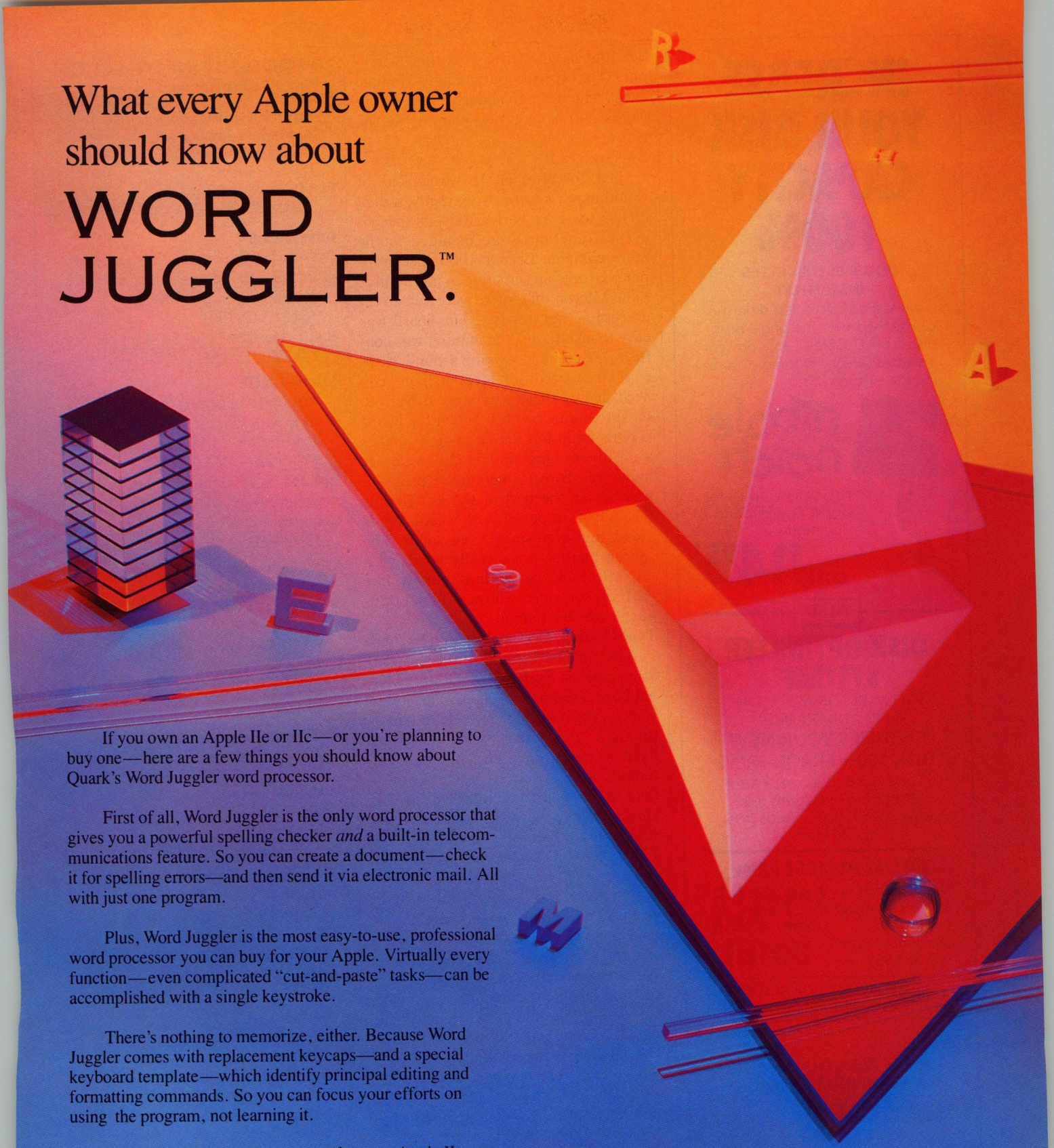


Figure 2: Digitized speech is recreated from a stored rendition of coded sound waves, whereas synthesized speech is created purely out of a digital description of what the desired sound ought to be.

What every Apple owner should know about WORD JUGGLER™.



If you own an Apple IIe or IIc—or you're planning to buy one—here are a few things you should know about Quark's Word Juggler word processor.

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Fact is, no other word processor for your Apple IIe or IIc gives you this unique combination of power, functionality and ease of use. And if all these advantages aren't compelling enough, check the price. Suggested retail is only $189.

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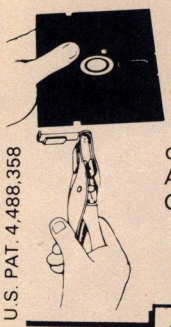

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dex and paying little attention to layout. The speech output is a female voice, which is particularly clear within words but sometimes choppy in the transitions.

Sweettalker II

The Sweettalker II we looked at wouldn't say a word. Apparently, it died on its way to us. Fortunately, its speech-output functions were included in the more complex Lis'ner 1000 speech-input board, from the same manufacturer (The Micromint), so we were able to try everything out anyway. The board was easy to install, but the manual was confusing—it tended to jump around, rather than proceed in logical fashion. You need one of those tiny screwdrivers to set the volume control. When the board is plugged in but not running, it makes a steady ringing sound. On the other hand, the Sweettalker demo program was by far the best of the lot. It runs through its repertoire of voices, reads aloud, and even sings a few songs. The speech quality is generally good, with an inflection that sounds almost like that of someone whose original language was Romanian.

Type 'N Talk, Personal Speech System

The Votrax Type 'N Talk and Personal Speech System (which are external boxes) require special cables, unless you run them through a modem. Unfortunately, the cable-wiring diagrams have some errors! The manuals, although attractively typeset, seem to take a particular delight in jargon. Once you get the cable squared away, connecting either system is quite easy. The Type 'N Talk gives no indication of when it is on, but the Personal Speech System has a power light. Both systems produce reasonably good speech, they take up no space on the disk or in memory, and are as easy to use as a printer. The Personal Speech System is supposed to be able to sing and play music, but we weren't able to get much in the way of understandable lyrics out of it.

The Medium is the Message

If you're just going to experiment, you're in for some fun. Although you may not find that your Apple has anything profound to say, in some respects the medium is the message. And perhaps if machines learn how to talk, maybe humans can someday learn better how to listen. ✚

Steve Rosenthal is a writer and lexicographer who tries to maintain a perspective on other joys and problems in the world besides those involving personal computers.

▶ PRODUCT INFORMATION

Echo+
Street Electronics Corporation
1140 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
List Price: $129.95 and up
CIRCLE 480 ON READER SERVICE CARD

Intex-Talker
Intex Microsystems Corporation
725 South Adams Road, Suite L8
Birmingham, MI 48011
(313) 540-7601
List Price: $295 plus $4 shipping
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Micro-LADS
Laureate Learning Systems
One Mill Street
Burlington VT 05401
(802) 862-7355
List Price: $650 for complete package, including six disks and Echo+
Requires: Echo+
CIRCLE 482 ON READER SERVICE CARD

Mockingboard
Sweet Micro Systems
50 Freeway Drive
Cranston, RI 02920
(800) 341-8001 or (401) 461-0530
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S.A.M.
Don't Ask Computer Software
TRONIX Publishing, Inc.
8295 S. La Cienega Blvd.
Inglewood, CA 90301
(213) 215-0529
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CIRCLE 484 ON READER SERVICE CARD

SSB-Apple
Multitech Industrial Corporation
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Sunnyvale, CA 94086
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Sweettalker II and Lis'ner 1000
The Micromint, Inc.
25 Terrace Drive
Vernon, CT 06066
(800) 635-3355
List Price: Sweettalker II, $104; Lis'ner 1000, $189
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Type 'N Talk and Votrax Personal Speech Synthesizer
Votrax, Inc.
1358 Rankin
Troy, MI 48083
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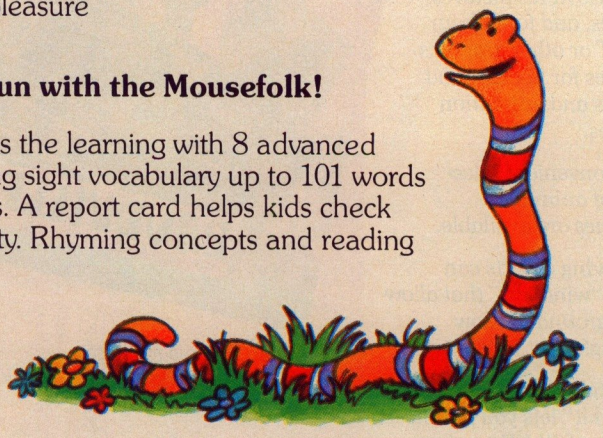

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▶ BY DELORES WOODS HUAJARDO

APPLE III SOFTWARE update

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An estimated 80,000 Apple III computers are being used by businesses every day, and the owners of these IIIs are adamant in their praise of the Apple III as one of the best business machines around.

In order to keep Apple III owners up to date, we are publishing a three-part list of software currently available for the Apple III. This is part two.

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MAZZETTI

▶ SOFTWARE

BY JOHN A. BARRY

righting your writing

TWO PROGRAMS THAT IMPROVE YOUR GRAMMAR

An irony of this technological age is that although so-called computer literacy is on the increase, traditional literacy is declining. It seems only natural, then, that enterprising software companies would develop products that exploit personal-computer technology to help improve the knowledge and skills related to literacy.

At least two companies have developed such products for the Apple II series of computers. From DesignWare of San Francisco comes The Grammar Examiner, and from EduWare Services of Agoura Hills, California, comes Writing Skills.

The Grammar Examiner

The Grammar Examiner is a program couched in a game format that is advertised as being "for ages 10 and above." A note to parents in its 30-page manual states: "We are now seeing an increasing emphasis on writing skills in an attempt to reverse this national trend." (1983 SAT verbal scores were one point above the lowest level ever.)

"Polishing is an important part of the writer's craft. Grammar and punctuation are the aspects of polishing that can be improved with The Grammar Examiner."

This program does show some promise as a tool to help improve grammar and punctuation.

The goal of Grammar Examiner players is to advance from the position of cub reporter, for a newspaper called *The Grammar Examiner*, to become the paper's editor in chief. The winner of the game, however, is the player who has accumulated the highest salary when someone becomes editor in chief.

In other words, you could reach the position of editor in chief first and still lose the game. This feature of the game raises an obvious question: Does The Grammar Examiner primarily foster good grammar or acquisitiveness?

Although the game stresses increasing your salary, the primary methods of augmenting it are correcting the errors in grammar and punctuation in certain paragraphs and selecting the grammatically and punctuationally correct sentence from a choice of two sentences (see figure 1).

The element of chance also figures into the game: Landing on certain squares on the game board (see figure 2) either increases or decreases your salary. You must move carefully to avoid landing on squares with arrows. These squares send you back to the beginning. A word of caution: The pieces that players move around the board tend to obscure adjoining squares, making a one-place move more difficult than it should be.

The game permits up to four players, or up to three people and the computer in the guise of "Melvin."

You can set Mel's IQ between 10 and 200 (depending on how well you want him to do), and you can set the overall skill level to one of three levels.

A valuable feature of the game is the ability to formulate your own questions and design your own board, in order to avoid repetition after playing for a while. I hadn't played the game long before I encountered some of the same canned questions more than once.

Most of the game is self-explanatory. The manual is mercifully short and to the point, but you can skip reading it because its highlights are reproduced in a brief on-screen tutorial.

In essence, the game is easy to learn, although the prose level of the manual may be over the heads of some ten-year-olds.

How effective is the game in fulfilling its goals? Initially, its goal seems more commendable than that of, say, blasting enemy aliens out of space.

The use of computer games in the classroom seems to be a result of a perceived failure of traditional methods of public education. Another line of reasoning is that kids raised on TV have short attention spans and can, consequently, benefit from the fast-paced nature of "computer tutors."

In fact, The Grammar Examiner suffers from excessive kineticism. The cursor zips over would-be grammarians' mistakes without allowing them sufficient time to dwell on the implications. Since the resolution of The Grammar Examiner's letters on the Apple II is crude, this problem is all the more noticeable.

Also noticeable—in the way that talking cars and elevators are noticeable—are The Grammar Examiner's sound effects; fortunately, you can turn the IIc's volume down or off.

These elements of the program aside, The Grammar Examiner can serve as a useful supplemental tool for improving grammar and punctuation. It covers a range of the elements of these two disciplines, and, generally, it rewards the correct answers. On at least one occasion, however, it encourages the dubious mixing of past and present tense in a sentence.

In another instance, the program gives the verb "rollerskate"; yet both *Webster's Ninth New Collegiate Dictionary* and *The Oxford English Dictionary* give *roller-skate*.

The spelling of *roller-skate* is open to interpretation, though, and The Grammar Examiner manual takes due note of different interpretations.

When a legitimate debate exists (e.g., should *editor in chief* be hyphenated?), the manual states unequivocally that if a player doesn't use the convention on which The Grammar Examiner has settled, the answer will be judged wrong. In cases of debate, the manual

ALAN MAZZETTI

spells out its preference in a section called "General Grammar and Punctuation Rules"—a valuable feature of the package.

To resolve debates, DesignWare claims to have used *The Chicago Manual of Style* as its arbiter. Yet in one exercise, the program gives you a "wrong" grade if you change "L's" to "Ls" to indicate the plural of the letter *L*. *The Chicago Manual of Style* clearly states that The Grammar Examiner blew it: in Chicago, the plural is *Ls*.

If DesignWare can clean up the few inconsistencies and errors in this program and improve the graphics, it will offer a more valuable program to help its users polish their writing.

Writing Skills

A more ambitious and comprehensive writing-improvement package is Writing Skills from EduWare, which comprises five disks devoted to the following areas of grammar: volume 1: possessives/contractions, noun plurals/possessives, subject/verb agreement; volume 2: pronoun/antecedent agreement, commas, sentence fragments; volume 3: quotation practice, pronoun cases, subject/verb agreement; volume 4: pronoun/antecedent agreement, troublesome modifiers, subject/verb agreement; and volume 5: pronoun/antecedent agreement, problems of case and consistency. Because it is more ambitious than The Grammar Examiner, however, doesn't necessarily mean it's better.

Writing Skills works best from the bottom up—the bottom being tutorials the program provides if you don't do well in tests, which constitute the top. (See figure 3 for an example of a tutorial.) The tutorials competently coach you in various skills. You can sometimes bypass the tutorials if you perform well in the tests.

If you don't do so well in some areas, the program flashes a menu (see figure 4) that shows which areas you should study. If you fare reasonably well in an area, you get an "OK." A grade of 100% in any area means you made no mistakes.

Although the tests do an adequate job of judging your abilities in discrete writing skills, they tend inadvertently to encourage a few bad habits along the way. The tests overlook the general writing-skills picture in order to concentrate on specific elements of it.

For example, the first disk in the series drills you in its designated areas (possessives/contractions, noun plurals/possessives, subject/verb agreement). It also showers you with sentence fragments, misplaced modifiers, and improper punctuation.

Since this series of programs is aimed at "people with some knowledge of English grammar who want to improve their ability to communicate through the written word," the assumption is that such people won't necessarily know a misplaced modifier when they see one.

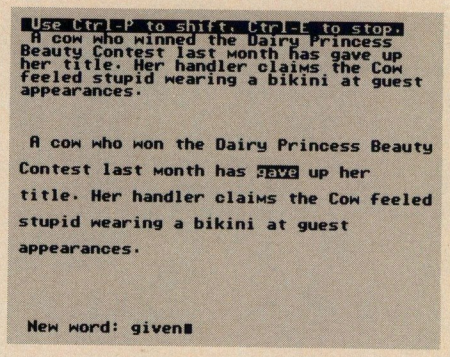

Figure 1: An example of a Grammar Examiner paragraph with errors to correct

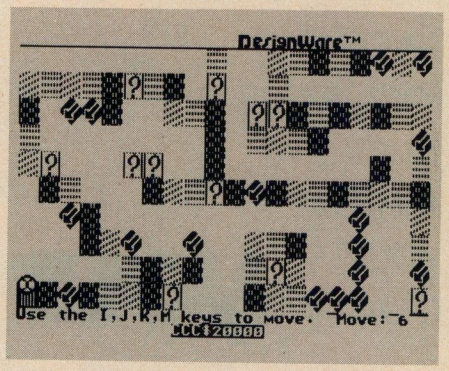

Figure 2: The Grammar Examiner game board

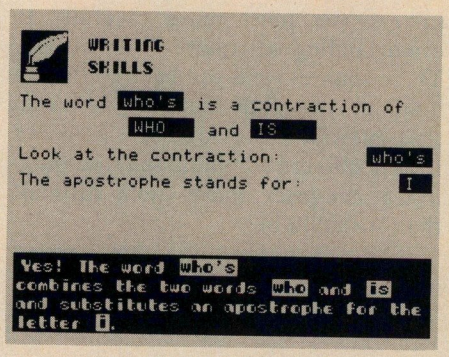

Figure 3: An example of a Writing Skills tutorial

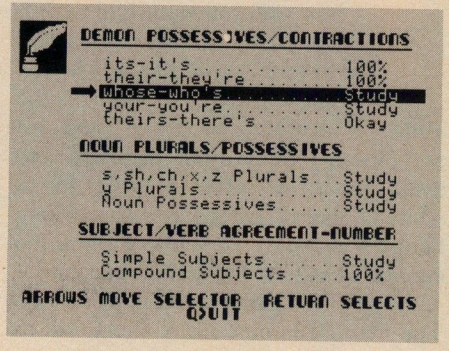

Figure 4: An example of a Writing Skills study menu

Furthermore, since improperly located modifiers are rife in contemporary writing—and since the Peachtree program all but endorses them—this software is fostering the use of solecisms.

Another problem with the tests is that their prose is sometimes nebulous and disjointed. Liberal use of nonspecific demonstrative pronouns may lend a quasi-poetic effect to the prose, but it also makes it a little confusing.

Documentation

Before you even encounter the tests, though, you will probably consider the manual, which is more essential to read than The Grammar Examiner manual. Luckily for you, one manual covers all five disks, which saves you from having to read about 200 pages of documentation.

At 42 pages, the Writing Skills manual is succinct, but any tool that purports to improve writing skills draws critical attention to itself when it errs in that area. Nitpicking this criticism may be, but the manual uses the word *remediate* as a transitive verb—in this case, it's allegedly synonymous with *remedy*. According to *Webster's Third New International Dictionary* and *The Oxford English Dictionary*, such a verb does not exist in the English language.

In another instance, the manual provides erroneous information about the program's operation. "If you successfully correct every error in the pretest, you bypass the Main Menu and go directly to the first topic test." True and not true! I purposely whizzed through a pretest without making any corrections. Nevertheless, the program took me immediately to the topic test.

An inconvenient snafu in the manual is inconsistency of terminology. The manual refers to the nonsystem disk as the "lesson disk," yet the disk itself is labeled "program disk."

Molasses

Whereas The Grammar Examiner is hyperkinetic, Writing Skills is lethargic in comparison. Although the lethargy can be frustrating, particularly as you wait for one screen to change to another, it allows you to dwell on changes you've made. You also have the advantage of being able to meander back and forth through the tests more comfortably than you can in The Grammar Examiner. Additionally, this series is not

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The Apple II... HOT-LINE

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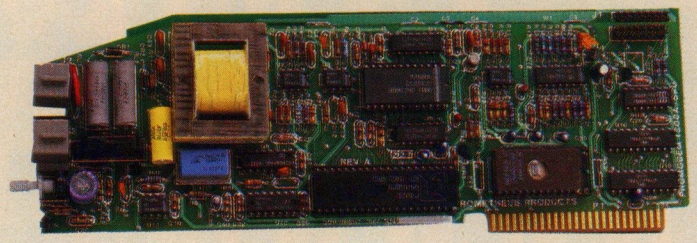

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A Powerful Menu-Driven Terminal Program

```
1200A TERMINAL DRIVER
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```

```
1} COMMUNICATIONS
2} FILE TRANSFER
3} OPTIONS
          USE ESC TO EXIT
          ENTER SELECTION
```

```
1} BAUD RATE  1200  300
2} DATA BITS  8  7
3} PARITY  NONE  ODD  EVEN  MARK  SPACE
          USE ESC TO EXIT
          ENTER SELECTION
```

```
1} TYPE        XMODEM  LINE
2} DIRECTION   SEND  RECEIVE
3} FILE NAME
          USE ESC TO EXIT
          ENTER SELECTION
```

```
1} PRINTER       ON  OFF
2} CLOCK         ON  OFF
3} STATUS LINE   ON  OFF
4} KEYBOARD      ON  OFF
5} CAP LOCK      ON  OFF
6} ECHO          ON  OFF
7} LF AFTER CR   ON  OFF
          USE ESC TO EXIT
          ENTER SELECTION
```

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plagued with the annoying sound effects that issue from The Grammar Examiner.

Crisper screen resolution complements Peachtree's more methodical pace. The Grammar Examiner's graphics are crude in comparison.

An overall comparison of the two products seems to indicate that because The Grammar Examiner has kids in mind, it is bouncy, jaunty, and less refined than Writing Skills, with its staid, methodical characteristics.

For the most part, both packages effectively address the groups to which they're pitched—with some exceptions, such as those noted above.

Both packages can be frustrating to grammar mavens who don't have a serious need to "remediate" their grammar and writing skills. Such people may feel compelled to correct errors or improve sentence elements outside the purview of the limited area being tested—only to receive a message informing them that they're not allowed to make changes in those spots.

Yet, even pedants may find their memories refreshed by a reminder about some forgotten point of grammar or punctuation, especially in the comprehensive EduWare series.

Even though the Writing Skills series is more ambitious and serious-minded than The Grammar Examiner, it's not as well conceived. It exhibits a schizoid character—almost as if the tutorials and the tests had been conceived in relative isolation and then cobbled together.

The Grammar Examiner, though less lofty, is more cohesive. Its manual is demonstrably better than that of Writing Skills.

A Positive Step

Both packages have their flaws, but the goal—using computers as teaching tools—is laudable, though not yet fully understood. Debate is ongoing about the proper role of computers in education. Computer-aided instruction has supporters and detractors, and both sides can muster compelling arguments.

Most people agree, though, that computers are useful supplemental tools in the education process, and DesignWare and EduWare bill their products as such. In the midst of all the dubious uses to which computers are put (e.g., the proverbial balancing of checkbooks), The Grammar Examiner and Writing Skills are serviceable products.

They will be better if, in future versions, their designers clean up oversights and mistakes that now exist in both products. ✚

John Barry, a free-lance writer and editor, is coauthor of The Unofficial I Hate Computers Book. *Four years ago, he was ordained as a minister in the Universal Life Church by Reverend Apple.*

▶ PRODUCT INFORMATION

The Grammar Examiner
DesignWare, Inc.
185 Berry Street
San Francisco, CA 94107
(415) 546-1866
List Price: $44.95
Requires: Apple II, II Plus, IIe, or IIc; 48K RAM
CIRCLE 395 ON READER SERVICE CARD

Writing Skills
EduWare Services, Inc.
28035 Dorothy Drive
Agoura Hills, CA 91301-0522
(818) 706-0661
List Price: $39.95 each volume
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM
CIRCLE 396 ON READER SERVICE CARD

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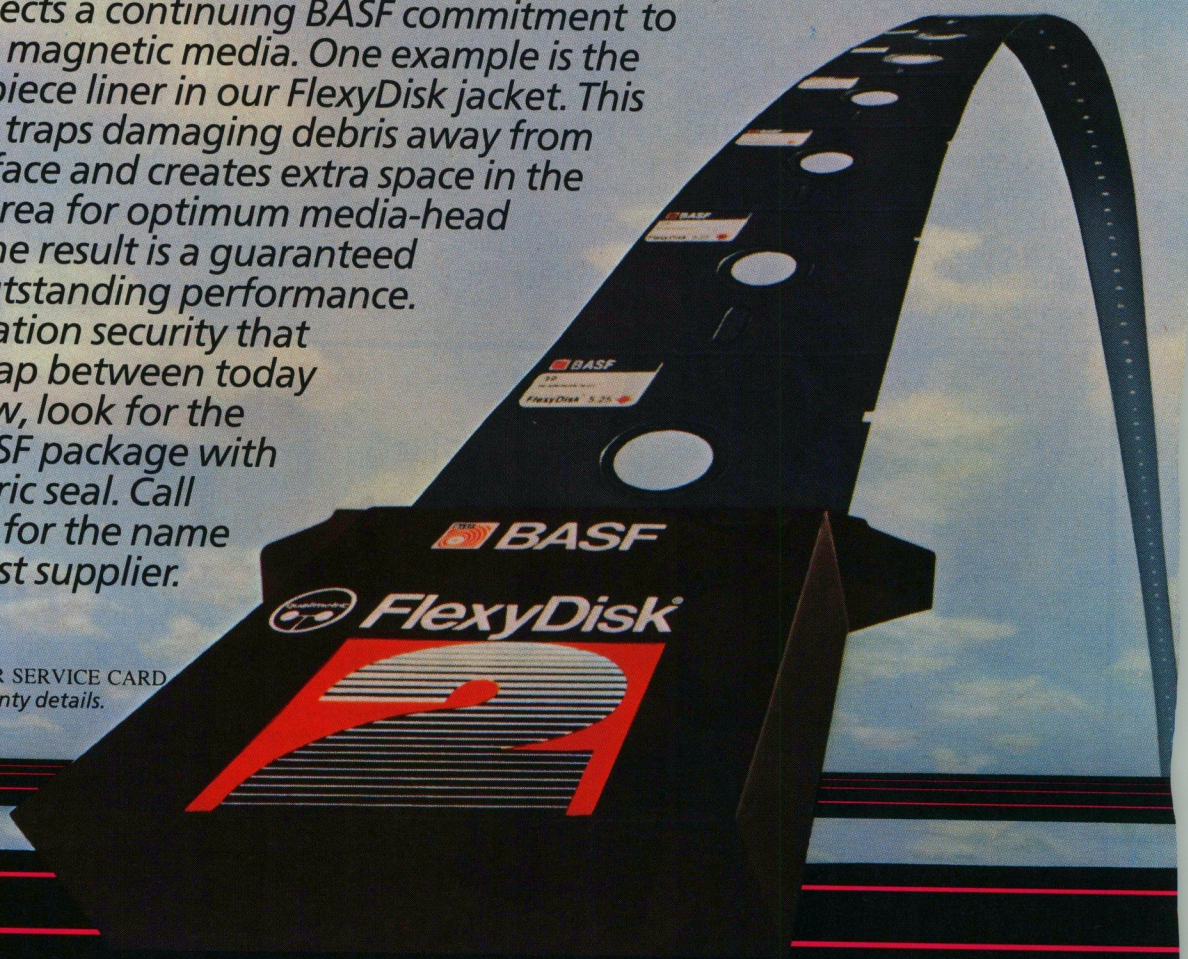

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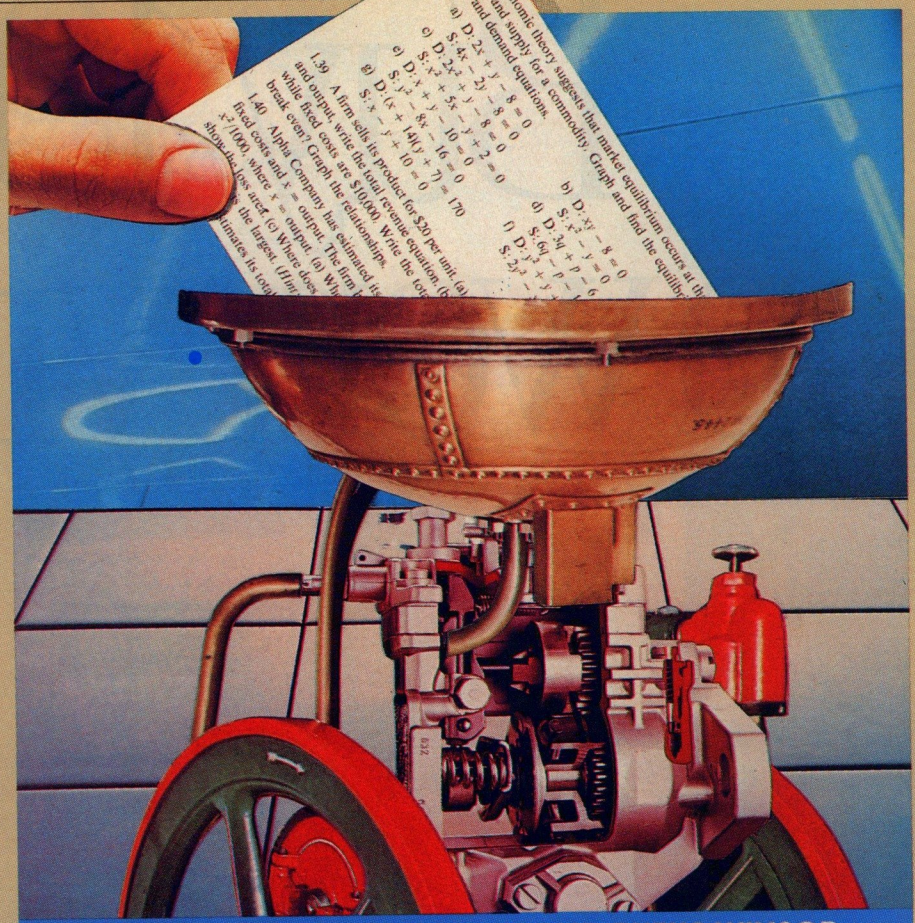

▸ SOFTWARE/BY GREG STONE AND RUFUS WINSOR

TK + YOU = SOLUTIONS

If you have problems that can be reduced to equations—problems, for example, in business, engineering, science, or education—then it's decidedly worth your time to take a look at TK!Solver.

This program from Software Arts allows you to state an equation, and it will then solve for any of the variables in the equation. The program can handle single or multiple inquiries and will spew out a list of answers in either tabular or graphics form. Although we know it is not a package that everyone needs, we are impressed by its sophistication, versatility, and relative ease of operation. TK!Solver is available for several computers, including the Apple II series and the Macintosh. The version we are reviewing here works on the Apple IIe with Extended 80-Column Card (bringing the memory to 128K), DOS 3.3 , and a single disk drive (two drives are recommended but not necessary).

An Example

As an introduction to TK!Solver, let's work through a simple example. Suppose you want to find the corrected time for a competitor in a sailboat race, and each boat has a different handicap. The formula is simple: *Corrected time* equals the *elapsed time* divided by the *handicap*. Select Rules Sheet and type your equation in abbreviated form, choosing variable names that mean something to you.

```
Ctime =Etime/Handicap
```

In a separate window on what is called the Variable Sheet, your words *Ctime, Etime,* and *Handicap* also appear, placed there automatically by the program. Next to these words you type appropriate inputs. In this example, if the sailboat carries a handicap of 108.5 and the elapsed time for this race is 35.23 minutes, you type that information in and strike the exclamation-point key (the Action key in TK!Solver). The corrected time will appear next to the variable Ctime.

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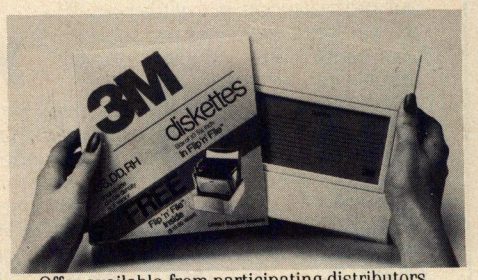

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We agree. In actual practice, however, this problem involves a few more details. If, for example (to add a new twist), the race-timer's watch had shown 35 minutes 14 seconds, how would the program arrive at a time of 35.23 minutes? By converting seconds to fractions of minutes, but that's another step—a formula. With TK!Solver you add that formula to the sheet and let the program do the conversion. Still trivial? What if you have 23 boats racing and the handicap depends on the type of boat, as well as the wind speed for the race? Now you have more variables, more formulas, and a chance to deal with lists.

Suppose you came in fifth in the race, you know the corrected time of the winner, and you're curious to know what your elapsed time would have had to be for you to have won? Now you must work the basic formula a different way, solving for a different variable. Here again TK!Solver does most of the work for you. You enter the formula once, and the program solves for any of the variables. In actual practice, we find that each season there's a boat in the race for which no handicap is available. This system derives handicaps empirically, based on a boat's performance in many races measured against the performance of a boat with a well-established handicap. Your question is: What handicap would this boat need to match the performance of a known boat? You solve the formula now for a third variable, and since you want to do this over many races to establish an average, the program conveniently allows you to enter and receive a list.

Users can adapt TK!Solver to meet their specific problem-solving needs.

What Else?

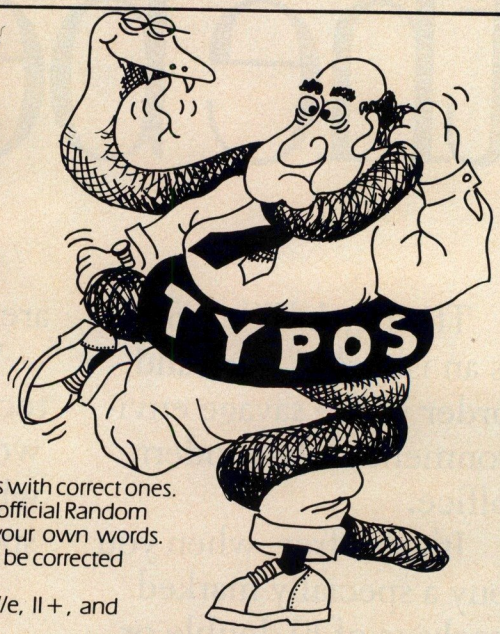
Although many computer users couldn't care less about deriving corrected times for a sailboat race, they might be interested in some of TK!Solver's multitude of other uses. Examples of such uses include:

- Finding solutions to compound-interest problems—including present and future values of lump sums and annuity streams—for any frequency of compounding, including continuous compounding
- Analysis of heat transfers from a fluid through a two-layered wall to a second fluid by way of convection, conduction, and radiation
- Solving problems involving Joule's law, Ohms's law, resistivity, and circuits with resistors in parallel or with resistors in series

These examples, incidentally, are taken from TK!SolverPacks, which are supplementary software packages for Financial Management, Mechanical Engineering, and Introductory Science, respectively. Although you can solve equations in these fields with the basic program only, these additional packages make life easier for TK!Solver users by providing predesigned models for specific purposes. Each package contains about a dozen models.

As with other basic computing tools, such as spreadsheets, word-processing systems, and database software, users can adapt TK!Solver to meet their specific problem-solving needs. Because the program's uses include solving business, engineering, and science problems, TK!Solver is also useful in teaching students to solve such problems. In fact, it offers several advantages in an educational environment. Teachers and students can flip quickly between tabular and graphic solutions

It takes only One Spelling Mistake to blow your image



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*It works with all the following word processors, with owners of trademarks indicated in parentheses: AppleWorks & Apple-Writer, all versions (Apple Computer, Inc.); Bank Street Writer (Brodebund); Format II (Kensington Microware); HomeWord & Screen Writer (Sierra On-Line Inc.); Word Handler (Silicon Valley Systems); CP/M-Wordstar (Digital Research Corp.-Micropro International); PFS: WRITE (Software Publishing, Inc.); and others. All features are not available with CP/M, PFS: WRITE & Word Handler.

CIRCLE 227 ON READER SERVICE CARD

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A User's Guide to Public Domain Software

The Computer Learning Center's Public Domain Library collection has been assembled from a variety of sources. Each one of these Public Domain Software (PDS) programs is unique. Some are early versions of copyrighted programs donated by the author(s). Many are simple versions of more complex programs available at much higher prices. Some are even actual routines that were later combined into a larger program now selling for a great deal of money.

Most of the programs are in BASIC so that you can modify them and use them in your own programs; best of all, they are not copy-protected.

You can make as many copies as you want and give, trade or sell them to whomever you please.

BUYING PDS VOLUMES

The Public Domain Library run by the Computer Learning Center contains a collection of programs that have been donated to the public and, therefore, have no copyrights attached. Such programs may be copied and distributed by anyone without regard for origin or ownership since they are owned by the public at large.

Public Domain Software is also known as FREEWARE.

The $4/volume fee charged by the Computer Learning Center covers the cost of the disk and costs involved in copying, labeling, packaging, mailing, and other related expenses.

WHO CAN USE IT

There are over 175 volumes in the Computer Learning Center's PDS library collection. All of these volumes will run on Apple II computers or Apple II compatibles.

APPLE IIe, IIc & III OWNERS

Some machine language programs will function erratically on the IIe and IIc. This is because of changes in the F8 monitor. Many of the PDS programs will work on the Apple III in emulation mode. We have not tested all of the programs nor do we have a list of what works. So be careful. "Caveat Emptor."

PDS FORMAT

All of the PDS disks are supplied in DOS 3.3, 16 sector format. We do not supply DOS 3.2 or ProDos formatted disks.

NEEDS WORK?

Occasionally you will notice a ◄ after a program title. This symbol is our way of telling you that this program needs some work on it.

DOCUMENTATION

Documentation, if it exists, is on the volume with the program. Usually the documentation has the same name as the program except that a 'DOC' is added to the name.

WHAT ABOUT COPYRIGHTS?

When you read the PDS listings, you might notice a © after the name of the individual program in a particular category. This abbreviation indicates that a copyright was attached to the program when it was contributed to the public domain. When you use these copyrighted programs, or if you copy them for someone else, be sure to give credit to the thoughtful author who gave the program to the general public. Keep the copyrights and authors' credits on the program.

We do not knowingly list programs that are copyrighted. If you discover that a program on a Computer Learning Center volume is copyrighted (other than contributed programs already identified with a © after the title) you may order a free PDS volume with your next PDS order. In order to get this free volume, however, you MUST provide good documentation of your findings.

MAKING SENSE OUT OF THE PDS CATALOG LISTINGS

The name of each volume is in bold lettering followed by a number. When ordering, use the name and number of each volume you want.

The column of titles under the volume name shows the individual programs on that volume. So, if you're interested in business programs and are glancing through our Business & Finance PDS volumes, you'll notice that Business & Finance #19 has a letter writer program and a phone list program as well as programs for stocks and Visicalc formulas. Remember the ◄ symbol (program needs work) and the © symbol (copyright).

PROGRAM LANGUAGES

The individual programs on each volume are all keyed with a language code. The left column indicates the language required by the program.

Looking at our B&F#19 again, you'll note that the letter writer program is Integer BASIC (noted by an "I") while the stock monitor program is in Applesoft (noted by an "A").

Code requirements:

A - Applesoft in ROM or Applesoft firmware card or Language card and DOS 3.3 master disk.

I - Integer in ROM or Integer firmware card or Language card and DOS 3.3 master disk.

B - These programs are written in machine code. If the program uses routines from Integer or Applesoft, then the requirements for I and A programs apply.

T - These are text files and are used by the other three program types.

PROGRAM SIZE

Next to the language code is a column with three digits. This column indicates the number of sectors that each program occupies on the volume.

The letter writer program on B&F#19 uses 6 sectors on the volume.

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If a program crashes, the disk may have a bad sector. We will replace any disk that has a bad copy of a program or one that has media defects. Return the disk to us with a note explaining your difficulties. Some programs will give SYNTAX ERRORS. These are not media defects or bad copies.

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Apple Tutorial

Apple Tutor 001

I	004	Basic Programming
I	036	Basic Programming 1
I	047	Basic Programming 2
I	048	Basic Programming 3
I	044	Basic Programming 4
A	004	Basic-Integer
B	022	Basic-Integer.X
I	019	Conventions
I	016	CPU 6502
I	002	Hello Sample
I	030	Micro 6502 Simulation
I	051	Mini Assembler Tutorial
A	022	Random Drill Tutor
I	007	Sweet 16 Disassembler
I	004	Sweet 16 Speed ?
B	002	Sweet 16 Speed.X
I	026	Top Down Programming

Apple Tutor 002

A	021	Apple II Demo
A	004	Basic Exercise
I	043	Basic-Applesoft
I	093	Disk Aide.13
I	038	Disk Aide DOC
B	003	Disk Aide.X
A	028	DOS System Instruction
A	013	Pilot Version I
I	054	Program Development Pkg
A	014	Supplement Mini Assembler
B	006	Supplement.X
I	003	Text File Read
I	003	Text File Write
I	009	Text Hello
T	009	Text How To
T	010	Text Intro
T	006	Text Peek Poke Call
T	010	Text Programming
T	007	Text Redbook
T	011	Text Software
A	002	Buzz

Art & Graphic

Art & Graphic 011

A	006	Art Align
A	002	Art Bars
A	003	Art Circle
A	002	Art Demo
A	003	Art Diverging Circles
A	003	Art Diverging Octagons
A	003	Art Double Cross
A	006	Art Dougs Theme
A	003	Art Drifting Circle
A	003	Art Drifting Octagon
A	004	Art Elephant
A	003	Art Figure 8
A	005	Art Horizon
A	007	Art IBM
A	003	Art Octal 8
A	002	Art Oneliner 7
A	007	Art Super Kalied
A	003	Art Twist II
A	015	Art Xmas Card
A	014	Auto Space War II
A	002	Billboard Mother
A	002	Graphic Switch
A	010	Graphics Tablet
A	008	Hi-res Text Demo ?
B	007	Hi-res Text Set
A	004	Higher Hires
A	006	Hires Sketch
A	003	Invert Monitor Mode
A	035	Life
B	015	Life Language
A	004	Life Leader
A	002	Picture Loader
A	016	Plot Pourri
A	010	Poster ?
A	008	Poster Banner I
A	009	Poster Love II
A	003	Rubber Apple
A	020	Shape Editor
A	010	Shape Generator
A	003	Shape Instr
A	023	Shape Table Editor
T	001	Shape Table for Hires Label
T	002	Shape Test
A	015	Skywriter
A	003	Skywriter I
A	003	Skywriter II
A	025	Skywriter Instr
A	013	Skywriter Snoopy
B	018	Star.shape
A	005	TV Pattern Generator

Business & Finance

Business & Finance 018

A	005	Annuity Principal & Int.
A	003	Annuity Reg. Deposits
A	018	Annuity ◄
A	013	Bond Price & Interest
A	012	Bond Value
A	032	Budget Monthly
A	013	Decision Matrix
A	054	Financial Pak
A	016	Invest. Annuity Forecast
A	012	Keogh Savings Program
A	014	Loan Amort. Schedule
A	008	Loan Direct Reduction
A	004	Loan Interest
A	029	Market Evaluator Pak
A	009	Mortgage Calculation
A	007	Nicer Writer ◄
A	003	Regular Deposits I
A	007	Sales Tax At 6%
A	017	Security Analysis
A	006	Sec. Analysis Copy Data
A	003	Simple Interest
A	010	Stock Option Analysis
A	016	Stock Op covered hedge
A	015	Stock Option Pricing I
A	021	Stock Option Pricing II
A	008	Stock Portfolio Valuation
A	028	Stocks
A	010	Trip Cost Analysis

Business & Finance 019

I	030	Calendar Personal
I	006	Letter Writer
I	006	Letter Writer Enhance
I	014	Phone List
I	005	Real Estate Plot
B	034	Real Estate Plot.X
A	012	Stock Monitor I
A	015	Stock Monitor II
A	024	Trend Line Analysis
A	006	Visicalc Coord Formulas
A	012	Visicalc D File Printer
A	014	Visicalc Formulas
A	006	Visicalc Formulas Instr

Business & Finance 020

A	025	Apartment Mortgage
A	052	Banking And Finance
A	058	Business Finance
A	006	Check Stub
A	020	Household Exp. Profile
A	041	Income Tax 1040 For 77
A	029	Inventory Company
A	004	Inventory Cost File Entry
A	016	Inventory Home I
A	022	Inventory Model
A	009	Inventory Print ◄
A	003	Inventory Shortest
A	003	Inventory Shortest Read
A	023	Inventory

Computer Learning Center P.O. Box 110876-AL Tacoma, WA 98411

A 003 Inventory.DOC
A 019 Inventory.File Create
A 029 Inventory.File Read
A 018 Stock Market Forecaster
A 011 Stock Valuation

Business & Finance 021

A 004 Annuity
A 004 Average Growth Rate
T 001 Basenamefile
A 046 CAC Record System ◄
A 009 Check Book Balancer
A 008 Check Writer
A 004 Depreciation Amount
A 003 Depreciation Rate
A 010 Depreciation Schedules
A 003 Depreciation Straight
A 004 Disc. Commercial Paper
A 024 House Sales
A 005 Income Taxes
A 012 Interest Earned
A 003 Interest Rate
A 038 Inventory Home II
A 004 Invest. For Withdrawals
A 004 Investment Future Value
A 004 Investment Initial
A 013 Lease Computation
A 031 Life Mgmt And Finances
A 012 Life Mgmt Txt Organizer
A 005 Loan Balance
A 007 Loan Interest Rate
A 005 Loan Last Payment
A 004 Loan Principal
A 005 Loan Regular Payment
A 004 Loan Term
A 004 Mortgage Computer
A 007 Mortgage Table
A 063 Payroll
A 004 Regular Deposits II
A 003 Regular Withdrawals
A 004 Salvage Value
A 009 Savings Growth
A 011 Survey Data Reduction
A 003 System Reliability
A 004 Treasury Bill Valuation

Business & Finance 022

A 013 Address File
A 012 Print Amortiz. Schedule
A 013 Amortization Sched Scrn
T 002 Bork.INV
T 003 Bork.OPF
T 003 Comp.INV
A 009 Compound Int. Tables
A 008 Ellwood Graph Points
A 009 Print Ell. Gr. Points
A 029 File Manager
B 003 File Manager.X
A 018 Home Accounting
A 010 Print Inc. Approach
A 025 Print Inc. Approach Rate
A 011 Inc. Approach Screen
A 049 Income Tax
A 021 Inventator
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Music & Sound 064

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Passion 067 (X-rated)

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T 002 Binadr
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B 005 Lit
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to the same equation, a process that can enhance the learning process.

A Flexible Tool

In order to adapt TK!Solver to a specific need, you must understand your problem and invest some time in learning the program. We found that it took from one to three hours to become reasonably comfortable with the major features of the program, although users should be able to enter simple problems after the first 30 minutes. As with a good spreadsheet, however, it takes much longer to become a sophisticated user who can take full advantage of this powerful tool.

TK!Solver uses two methods to solve problems, direct and iterative.

We discovered some major points that you should keep in mind as you work with the program.

You can enter equations as you formulate them. You don't have to enter them in a special way or order.

The program can solve explicit as well as implicit equations, such as SIN (X* Y) = 1/2.

You can change the units associated with any of the variables without having to alter the equation.

There are a number of built-in functions, such as atan(x), log(x), and sum(series). In addition, you can define your own functions. Models you have built and saved to disk can later be merged into more complex models.

The Apple IIe version can't easily do matrix operations or numerical techniques for integration, and it is unable to do symbolic calculus. What it can do is find real-number solutions for most sets of algebraic equations.

The program supports the DIF (Data Interchange Format), a standard storage format developed by Software Arts that lets different programs exchange data.

How It Works

TK!Solver uses two methods to solve problems, direct and iterative. It always attempts to use the direct solver first. Basically, it uses the direct solver when you can supply enough values to solve the equation algebraically. It uses the iterative solver when not enough values are known and it is necessary to make successive guesses.

For a single equation, the direct solver works if all variables, except the one being solved for, have input values; the variable being solved for appears just once in the equation; the variable being solved for is not the argument of a function without a unique inverse.

The same rules apply to models with several equations, as long as these conditions are met sometime during the solution process. A nice feature is that the program passes along output values from one equation to be used as input values for other unsatisfied ones in the same model.

Iteration, which uses successive approximation to find an answer, can often solve an equation when the direct method cannot. Normally you would make a first guess at an answer, but the iterative solver can be set to automatic operation, making a guess unnecessary. If you choose this option, the program automatically tries to solve an equation that it was unable to solve using the direct solver method.

Using the iterative solver—in the mode that requires a first guess and allows users to set the number of iterations—could be a very handy tool for improving students' performance in estimation.

Using the Program

When you use TK!Solver, you build a model for solving a particular problem or related set of problems. This model building is both the most exciting and difficult part of the process. After all, TK!Solver may be able to solve your model very quickly, but it has no way of knowing if it is the correct model for your application.

Using a model is ridiculously simple. It requires entering known data, pressing the "action" key, and noting the results on the screen or printer. The exclamation point is the action key. If you were building a model by hand, you would probably organize your information into categories, such as rules, variables, and units, providing a different sheet of paper for each category. TK!Solver uses the same technique.

The program has eight major "sheets" and several more "subsheets." Each sheet can either be placed on the screen by itself or share the screen with one other sheet in separate windows. In actual practice, much can be done with just three of these sheets—the Rule, Variables, and Units sheets—and we found it handy most of the time to have two sheets on the screen at once. The computer takes care of the busywork of updating related sheets, so when you make a change in one, related changes

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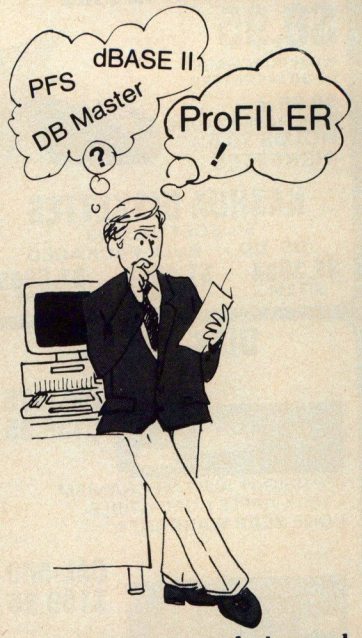

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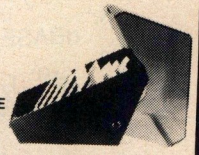

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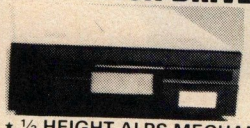

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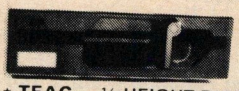

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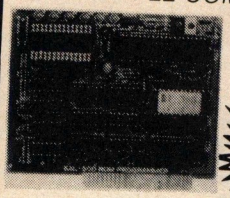

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▸ FOR THE MAC, LESS MEANS MORE

When you open the Macintosh version of TK!Solver, you notice immediately that some things are missing—such as the wall poster that outlines the program, the little foldout card of commands, and about half the manual. They are missing, but not missed, for the essential difference between the Apple IIe version and the Macintosh version is ease of use.

User Interface

You'll notice other differences—such as speed and graphics—but it is the user interface the Mac environment provides that makes the Mac version of TK!Solver a real pleasure to use.

Don't read that wrong. The IIe version of TK!Solver is impressive for what it can do. The Mac version doesn't do any more or less. TK!Solver is a new concept for the personal-computer user, though, and understanding the substance of the program is difficult enough. Therefore, any improvement in the user interface is most welcome.

In the Mac version of TK!Solver, you don't have to worry about such things as using the semicolon to switch back and forth between windows or the slash sign and equal sign to go between screens, or a host of other keyboard commands—some mnemonic and some not. In the IIe version, you get much more explanation and you get extra memory aids to get you through these commands as painlessly as possible. None of these aids are as painless as using the Mac mouse, though, with the pull-down menus, dialog boxes, familiar editor, and scroll bars.

If you know how to use MacWrite or MacPaint, you are going to find you know how to use TK!Solver. That is, you will know how to get about in the program and do all the standard things such as issue commands, edit entries you've made to the screen, save your current model, and load another one. In short, you can put the user interface to rest and concentrate on the meat of the program.

Other Important Differences

The high-resolution Mac screen is much easier on the eyes than looking at 80 columns on the the IIe screen. Charts are still utilitarian on the Mac version, but they are a bit sharper. The program operates on one disk drive with the IIe, but it's much more convenient to have two drives. On-line help files, for example, reside on a second disk, and with only one drive, the process becomes so slow and cumbersome that to access it almost defeats the purpose of on-line help. With the greater capacity of the Mac drives, everything is on a single disk. Finally, all operations are simply faster with the Mac's more powerful processor.

The on-line help on the Mac has a nice touch. As with the IIe, if you make an error, the program flags the row in which the error appears. But with the Mac, if you then ask for help, the program automatically goes to the section of the on-line help manual that relates to the error. The help information appears in a notepad-size window, complete with the Mac scroll bars.

The sheets (read screens) on the Mac version are nearly identical to the IIe screens. On the Mac two are always present, and they contain the familiar Mac scroll bars. With the IIe you can get more information on the screen at one time by choosing the option to open just a single window. This option doesn't exist with the Mac version. The Mac screens contain an exclamation-point icon that is the "action" icon. That is, when you want the program to carry out some action, you point to this icon and click.

All the familiar sheets and subsheets are here for listing rules, variables, units, and so on, with one exception. The Mac version does not contain a "global" sheet (a sheet in the IIe version that is just a housekeeping tool for setting such things as printer parameters). Everything that can be done on this sheet in the IIe version can be done through other means, such as pull-down menus, in the Mac version.

Finally, you have the Mac's wonderful flexibility. You can produce a graph with TK!Solver, type ⌘ Shift-3 to take a screen snapshot, and then take the MacPaint document thus created into MacPaint and enhance your graphics with labels and related drawings. The program also supports the Mac clipboard, letting you transfer results from TK!Solver to other programs, such as a report in MacWrite. Finally, as with the Apple II version, you can save files in the DIF format and transfer information to other programs using that format.

What this all boils down to is not so much a difference in programs, but a difference in machines. The Macintosh has a simple user interface, a more powerful processor, and better graphics. TK!Solver for the Mac takes advantage of this improved environment.

are made in other sheets and subsheets.

We found that the sheets help keep the planning process clear by separating different functions. You might want to start out, for example, defining the various units you wish to use and the necessary conversions between units. Later you can assign specific units to variables on the Variable sheet. The first unit to which you assign a variable becomes the calculation unit, and it is critical to keep these units compatible throughout a model. Once they have been assigned, however, you can use whatever input or output units you wish. The key is that all conversion relationships between units must be defined on the Unit sheet.

Besides the Variable, Rules, and Unit sheets, separate sheets exist for lists, plots, tables, user-defined functions, and for setting parameters for printing and various program defaults, such as maximum number of iterations. The program's plotting capability is handy, but strictly utilitarian—it has no fancy graphics. Tables can be displays or printouts of designated values, complete with titles for the report and headers for each column.

Ease of Use

The program makes good use of windows, top-of-the-screen prompts, error flags and messages, and an on-line help file that serves as a memory jogger. It makes full use of the arrow keys and uses special keys (the semicolon, colon, slash, and equal sign) to give other commands, such as to move from one window to another or to call up another sheet. At first these commands may seem cumbersome, especially if you've been weaned on menu-driven programs; but if you have used various spreadsheets, databases, or programs on mainframes or minicomputers, you will certainly find this structure conventional and easy to learn. The combination of top-of-screen prompts and the mnemonics of many of the commands also makes the program easy to learn.

One hint: The Return key serves as the Enter key, and it's a good idea simply to develop the habit of pressing this key every time you type in an equation or other input.

Documentation

The documentation is excellent. A small booklet gets you started gently working through one of several sample programs. A loose-leaf binder contains thorough, easy-to-follow documentation. The first half (about 200 pages) is an instruction manual, and the remainder is a reference section. There is also

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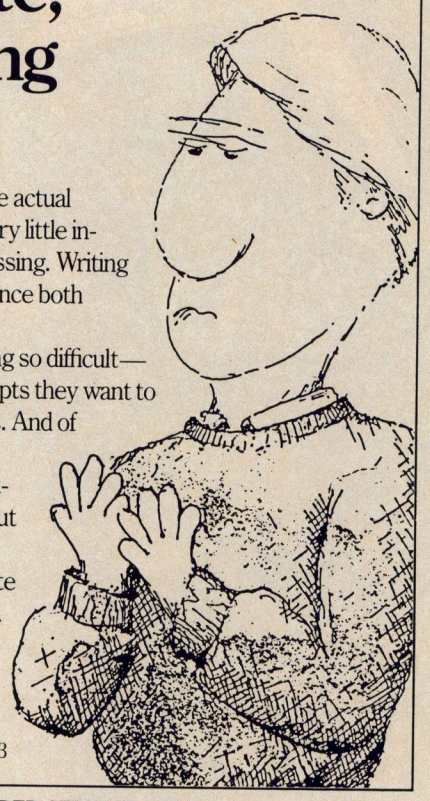

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a handy foldout reference card and a really useful wall chart that shows the relationship between sheets and all the basic commands you'll need to get around in the program.

What's more, you can begin using the program at several levels—you don't have to master the entire program in order to use it successfully. If you want an easy—but more expensive—shortcut, buy one of the additional TK!SolverPacks if you can find one that meets your needs. (You can modify these models to your own requirements.)

Conclusions

True to its claims, TK!Solver is an "entirely new concept in personal computer software." It is really a low-level symbolic operator (which means that it can manipulate symbols) with some modeling capabilities. We see it as having two principal uses. First, it will be useful in education in the fields of mechanical engineering, business, science, mathematics, and general problem solving. It will probably initially find more use at the college level, but both high-school and college faculty should be able to apply it in their classrooms; and we could see some of them developing some fascinating computer-assisted-instruction routines out of this software.

It should also be of general use to anyone now using a calculator for equation solving in analysis, design, and planning. Although somewhat limited in speed and capability by the Apple IIe (it has to access the disk quite frequently), a lot of program is built into 128K, and what it does, it does well. ✚

Greg Stone is a free-lance writer and director of community relations at Southeastern Massachusetts University. He has contributed to numerous science and computer magazines. Rufus Winsor is a mathematics professor at Southeastern Massachusetts University and has been using computers in education for the past decade.

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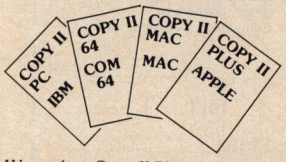

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The Sider

Most of us balk at paying twice as much for a peripheral as we did for the computer itself, and, not so long ago, that is precisely what Apple II owners had to to if they wanted to add a hard disk to their system. No one was surprised to find a $1200 five-megabyte hard-disk kit drawing a small crowd at the 1982 West Coast Computer Faire. Since then, hard disks have become even more affordable, but the price breaks have decidedly favored the owners of IBM and IBM-compatible machines—until the recent introduction of The Sider, a $695 ten-megabyte subsystem for Apple II Plus and IIe computers.

With the Sider mass-storage device, First Class Peripherals has taken the Apple II Plus and IIe another giant step toward becoming economical business tools for serious applications. Granted, Apple IIs have long been used for business applications, but—to programmers as well as users—the low (143K) capacity of Apple drives has always represented a serious drawback.

OK, so the price is right. The question is, does the Sider live up to reasonable expectations? Indeed it does. Not only does the Sider support four major operating systems, but it also provides various utilities, a toll-free technical-support telephone number, a one-year warranty, and a flat fee of $150 for out-of-warranty repairs. There is still room for improvement, though.

One area for improvement is immediately apparent: the only documentation supplied is a 54-page installation manual. Step by step, it takes you through the process of installing both hardware and software, but unless you are alert and somewhat experienced, a few unfortunate typographical errors may prove frustrating. For example, the manual requires that you copy a file named PDRIVERS from the CP/M installation diskette that comes with the unit, but the file's actual name is DRIVERS. Not everyone will be able to figure it out quickly. I have never understood why so much documentation is not beta-tested, the way hardware is. First Class tells me that a corrected installation manual is in the works, along with a more informative users' guide. Given its spectacularly low price, the Sider will probably serve a great number of Apple owners as a reliable hard disk, so it behooves the manufacturer to make its operation as uncomplicated as possible.

Setting up the hardware is simple and straightforward: You insert the controller card into slot 7 (you can change the slot assignment later with the help of the supplied software) and connect a couple of cables. First Class supplies clamps and L-brackets that fit the rear panel of an Apple II or IIe; all you need to furnish is a screwdriver. I had the hardware connected in less than 15 minutes. The software installation takes a little longer, but, typographical errors aside, it is also fairly simple.

Since the Sider, like all other hard disks, must be formatted and partitioned before use, the first step after the hardware installation is to determine how you want to distribute the space. The Sider can run DOS, ProDOS, CP/M, and Pascal, and although you don't have to install all four systems, you must reserve partitions for each. Thus, for example, you set aside a part of the hard disk for Pascal, even if you will never have any need for it. Of course, you'll allocate as little space as possible in such cases (see figure 4, page 70).

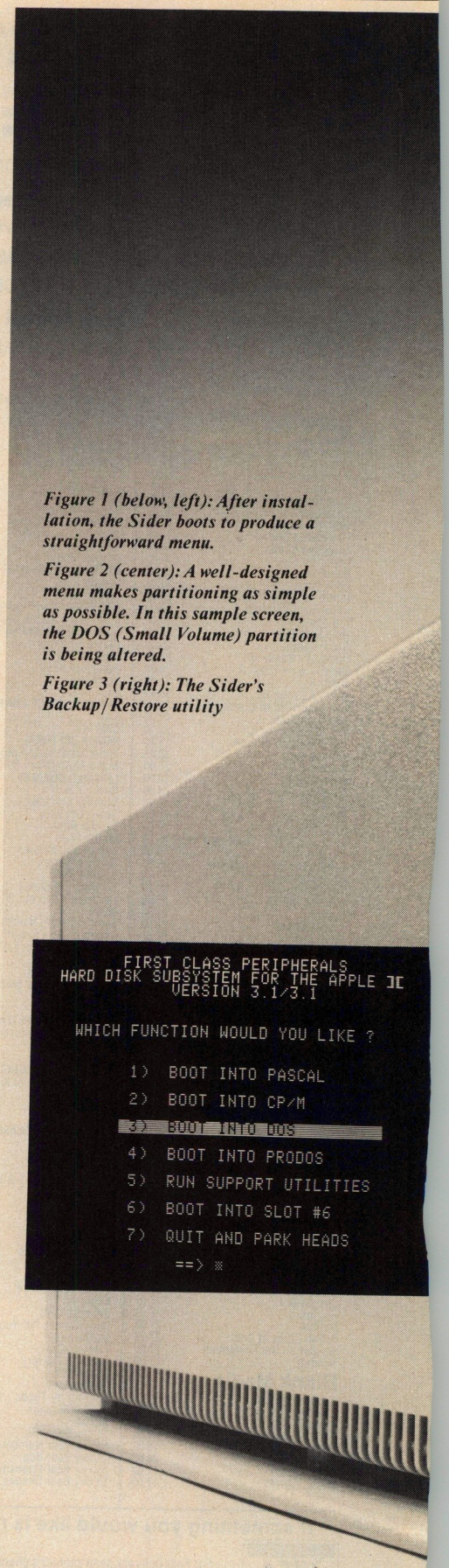
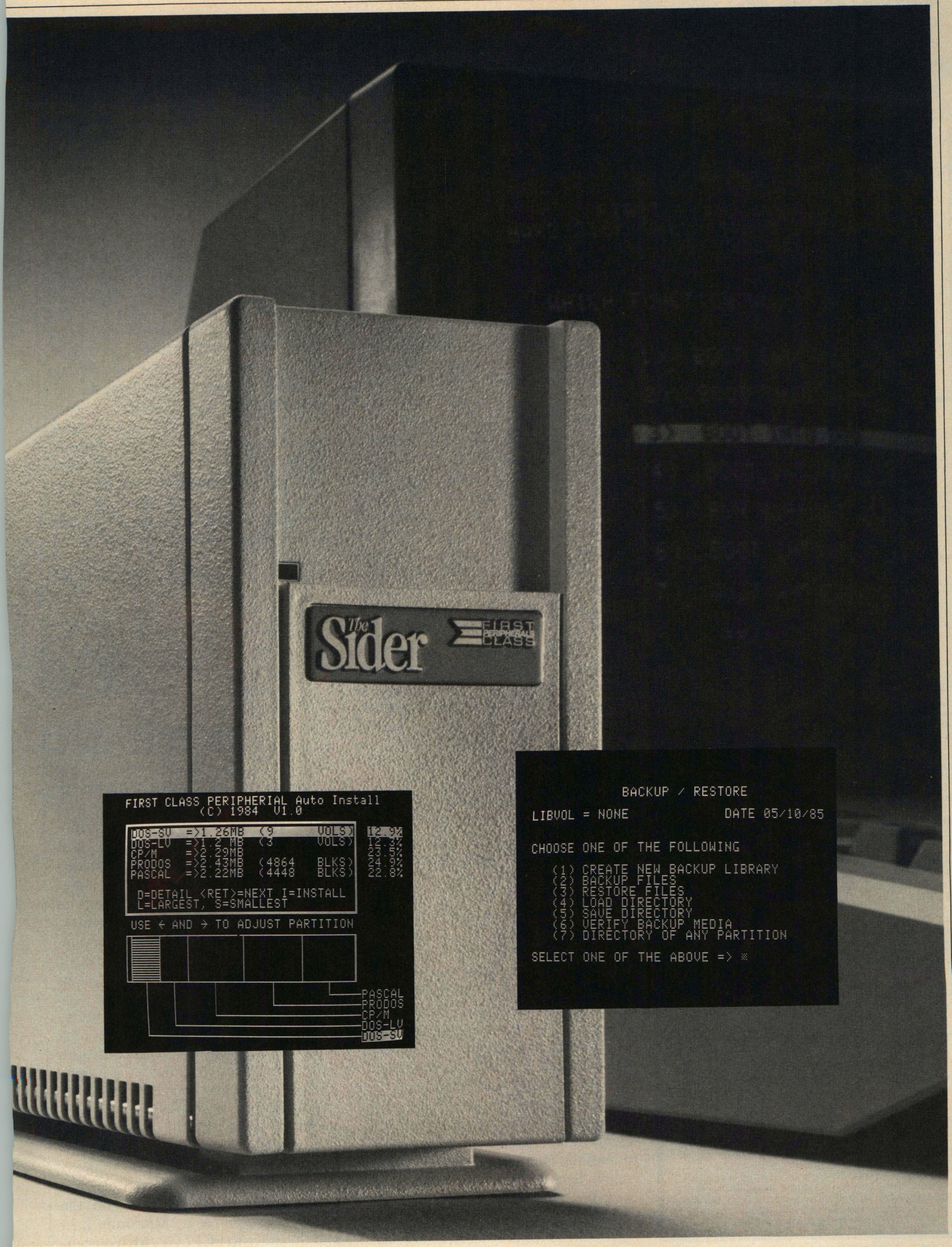


Figure 1 (below, left): After installation, the Sider boots to produce a straightforward menu.

Figure 2 (center): A well-designed menu makes partitioning as simple as possible. In this sample screen, the DOS (Small Volume) partition is being altered.

Figure 3 (right): The Sider's Backup/Restore utility



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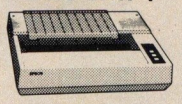

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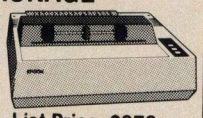

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System	Max Space	Breakdown	% of Disk Reserved	
DOS 3.3	8.94MB	(63 Volumes)	91.6%	488K
ProDOS	9.07MB	(18152 Blocks)	93.0%	332K
PASCAL	9.07MB	(18152 Blocks)	93.0%	332K
CP/M	9.07MB		93.0%	332K

Figure 4: The figures to the left represent the maximum allocatable space when you configure the disk for a single system. The column on the right shows the minimum amount of space that must be reserved for the other three systems combined.

Filling a ten-megabyte disk is surprisingly easy to do, but the good news in this case is that you can daisy-chain a second Sider to your first to get a total of 20 megabytes. Oddly enough, First Class Peripherals does not mention this important feature in its advertisement, but—assuming that the additional unit will cost less, since a second controller card is unnecessary—you can now get 20 megabytes of disk storage for less than the price you had to pay for a five-megabyte kit in 1982.

Getting back to the software installation, the actual formatting and verification process takes about 20 minutes, which seems like a long time until you consider how long it would take to format and verify the equivalent 70 or so Apple floppy disks. To install the software, you use the Sider's two "flippy" disks (i.e., four sides) of easy-to-use, menu-driven software. You use one side for the initial formatting, partitioning, and—for CP/M and Pascal—subdividing into volumes; it also moves the DOS 3.3 system and utilities to the hard disk and contains some handy utilities of its own. The other three sides contain support utilities for transferring the Pascal, ProDOS, and CP/M systems, respectively. Note that these utilities merely aid in the installation; users must supply the applicable system disks.

Slicing the Pie

Booting the installation disk first produces a series of screens containing explanations of the Sider's various features, and then it moves you right into Auto Install, which gives you the option of installing disk 1 or 2. Since I had only one unit, I selected disk 1, and the Sider immediately yielded the Auto Install screen in figure 2. You should plan the partitioning well, because, once they're installed, you can't change the allocations without starting all over again, which means copying everything to another medium and then transferring it back to the hard disk. In any case, don't forget to maintain backup copies of everything you have on the hard disk, for, great as they are, hard disks are quite sensitive. Crashes, though less common nowadays than they used to be, are almost always fatal.

Installing ProDOS is a simple matter of copying all of the files from the floppy systems disk to the Sider (designated /HARD1/), using the = wildcard symbol. The Sider supports two ProDOS volumes of equal size as well as tree-structured directories.

Moving Pascal to the Sider is more involved, especially when you're installing version 1.2. First you have to make a copy of the Apple1 master disk, rename some files, delete others, and do a lot of disk swapping; 35 steps later, you have the following odd configuration:

Pascal Unit	Designated Volume
#4	HARD 1
#5	HARD 2
#9	Floppy disk 1
#10	Floppy disk 2
#11	HARD3
#12	HARD4

Don't worry, a program for rearranging the above setup comes with the support utilities. Apropos support utilities, you get a handful of equally practical files: a diagnostic program that "will verify the well-being of your subsystem" by testing the ROM, host adapter, and controller in one second; a Mount/Dismount program for changing CP/M unit assignments; a program designed to change the DOS boot track, in case you wish to have the Sider controller in a slot other than 7; a versatile Backup/Restore program; and various more-common utilities.

Most of these utilities are pretty straightforward. Although an appendix in the manual lists the support utilities and their function, First Class Peripherals might have included more details regarding each. Should you need technical assistance, First Class Peripherals maintains a toll-free customer-support telephone number.

You have to choose between two methods of installing CP/M on the Sider: One applies to Microsoft 2.23 and the other to PCPI CP/M. You can-

not install both systems on the same disk. In both cases, the system diskettes must be modified, so you should use copies, but the installation itself is uncomplicated and relatively brief. With a hard disk, you must apportion CP/M into six volumes. If you're installing the Microsoft system, you can designate the floppy-disk drives, assuming that there are two of them, as volumes A and B or E and F, with the remaining four volumes residing on the Sider. The PCPI CP/M installation is less flexible, for it automatically assigns E and F to the floppy drives. To subdivide the four CP/M volumes contained on the hard disk, you select D (for detail) from the Auto Install menu and use the left- and right-arrow keys to increase or decrease the amount of space allocated to each volume. That amount ranges from 24 kilobytes to 8.19 megabytes.

CP/M Restrictions

One salient quality that I have not mentioned is the Sider's speed. I did not measure it, but the installation booklet claims an average access time of 155 milliseconds (including settling), and I have no reason to doubt that assertion. That the Sider supports only CP/M 2.23 (the 60K version) and four versions of PCPI CP/M will prove discouraging to owners who have already equipped their Apples with other CP/M formats (such as the common 2.2 version). It also means that Apple work-alikes that come factory-equipped with a Z80 processor cannot function with CP/M on the Sider, and even DOS can prove to be a problem when you hook the Sider up to an "unauthorized" Apple. Experimenting with the unit connected to my Basis 108, I was able to get DOS running—but only after minor modification of the Applesoft ROM—and all attempts to run CP/M failed. I had no such problems running Applicard's PCPI CP/M version 2.0 on my Apple IIe. In fact, that experience and the ease with which the Sider handled DOS 3.3, ProDOS, and Pascal, convinced *me* to order a Sider unit for my computorium.

The Sider has a few limitations, but they are easily outweighed by its advantages. Considering its low price and the existence of Apple-oriented hard disks that cost $2000 and cannot run any kind of CP/M, this product is a great boon for any Apple II Plus or IIe owner in need of mass storage. ✚

Chris Albertson is a New York music critic who has been using Apples since 1979.

▶ PRODUCT INFORMATION

The Sider
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List Price: $695 (includes ten-megabyte [formatted] hard-disk unit, controller card, cables, and software)

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Software: Installation disk and support utilities for CP/M, DOS 3.3, and Apple Pascal

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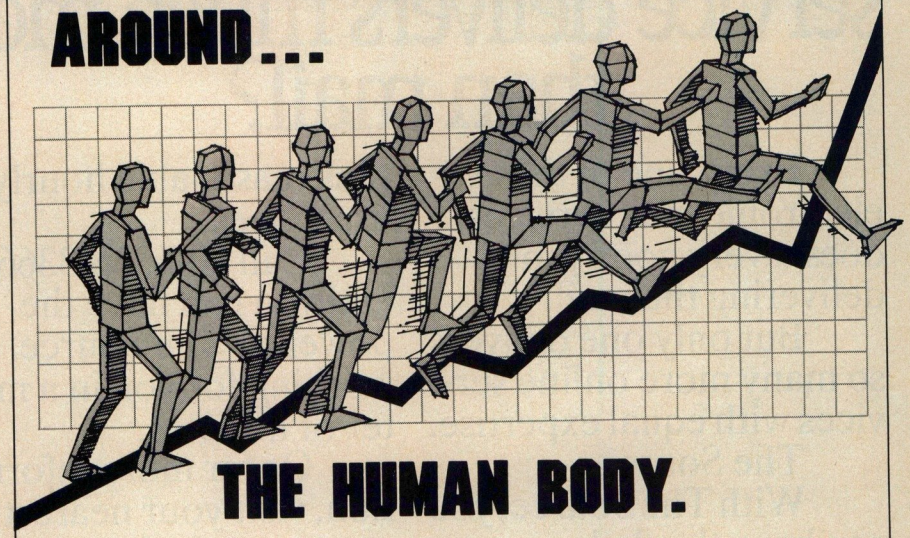

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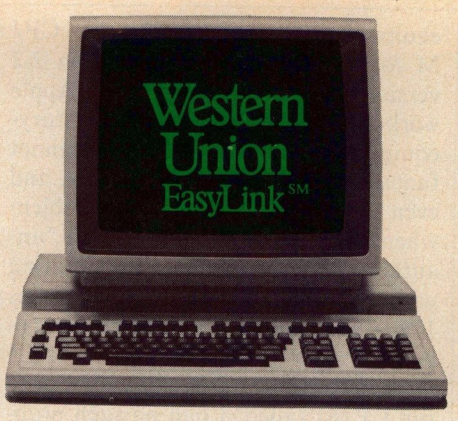

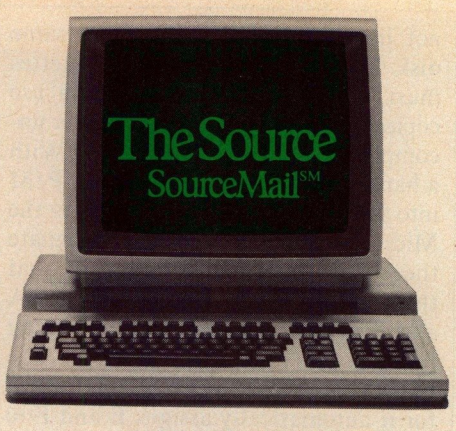

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CIRCLE 202 ON READER SERVICE CARD

AN UPGRADE FROM APPLE MAKES THE IIc COMMUNICATIONS GAP A THING OF THE PAST

Here's good news for Apple IIc owners: Apple has finally and firmly plugged the IIc telecommunications gap. Under a program that Apple is now offering, if your IIc doesn't work well with your modem, you can get your computer fixed, free of charge.

If you're an Apple IIc owner, taking advantage of this offer may be an important step. You can't do that unless you know what the offer is, why Apple is making it, and whether you're among those who qualify. So, if you've been waiting for it, here it is: the inside story of the telecommunications problems that have plagued the Apple IIc.

Last year, Apple IIc owners began noticing problems with telecommunications on the IIc.

About the same time, in Norcross, Georgia, a team of engineers at Hayes Microcomputer Products, Inc., discovered that the Apple IIc didn't work very well with Hayes Smartmodems. The engineers who detected the problem were running final tests on two modem-and-software kits—a 300-bps (bits per second) kit and a 1200-bps kit—which Hayes was planning to manufacture and market for the Apple IIc.

During the tests, communications sometimes turned out garbled when they were sent or received by a IIc hooked up to a 300-bps Smartmodem, and text turned to garbage when it was transmitted or received by a IIc connected to a 1200-bps Smartmodem operating at its top speed.

The scientists conducting the test quickly uncovered the cause of the problem: an out-of-sync crystal that sets the transmission rate at which the RS-232 serial port works. Tests showed that it oscillated 3% slower than the speed the IIc's specifications called for. According to Hayes, this speed variation "significantly exceeded" operating standards set by the Electronic Industries Association, a trade organization that determines operating standards for electronic equipment.

Nick Wreden, a spokesman for Hayes, says the sluggish IIc crystal operates better with some modems than with others. Some modems run a little slower than EIA standards specify, explains Wreden, and thus come close to matching the speed of the slow crystal in the original Apple IIc. Hayes Smartmodems run at exactly the speeds recommended by the EIA, however, and are thus out of synchronization with the IIc's faulty crystal, Wreden says.

When you use an early IIc with a 300-bps modem, Wreden continues, the effects of the slow crystal are usually not too noticeable. "In most cases, users will be able to communicate satisfactorily" at a speed of 300 bps, says Wreden. "Because of the magnitude of the Apple IIc serial-port variance from standard, however, problems will occur if you attempt to operate systems that work at rates slightly higher than 300 bits per second."

Apple Confirms the Problem

When Hayes informed Apple of its problems with the IIc, Apple conducted an exhaustive series of tests. After checking the Apple IIc with 17 non-Apple modems and six telecommunications programs, Apple concluded that the IIc's RS-232 crystal did indeed operate 3% slower than specified. The company then announced that the slow crystal would be replaced by an accurate crystal in all future IIc motherboards. Apple IIc computers with new-style motherboards started rolling off the assembly lines in December 1984, and Apple said that it would not use old, out-of-sync crystals in any IIc it made after January 1, 1985.

To help customers who had a IIc with an old-style motherboard, Apple sent its dealers a memo authorizing them to offer free motherboard replacements to IIc owners with non-Apple modems. Apple said it would provide the new motherboards to participating dealers free of charge and would pay each participating dealer a labor fee of $35 for every motherboard replaced under the program.

After Apple announced that it was modifying the IIc to solve the computer's communications problems, Hayes decided to go ahead with its plans to market a 300-bps-modem-and-software kit for the Apple IIc. Because text was so garbled when the IIc was operated at 1200 bps with a high-speed Smartmodem, however, Hayes suspended plans to manufacture and market a 1200-bps Apple IIc modem-and-software package.

As this article went to press, Nick Wreden said Hayes has not yet announced whether it plans to go ahead and release a 1200-bps kit for the latest IIc. He did say that his company was conducting tests on upgraded IIc computers, though. If the improved IIc works as well at 1200 bps as Apple has promised, Hayes will probably market a 1200-bps kit for the IIc, Wreden predicted.

How the Program Works

Nancy Sperry, Apple's product manager for the IIc, says that the board-replacement offer is a "customer-satisfaction" program that dealers are supposed to provide at no cost to IIc owners. To take advantage of the pro-

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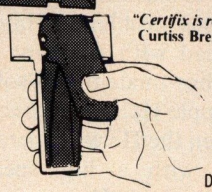

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gram, all you have to do is take your computer, built prior to January 1, 1985, to an authorized Apple dealer, along with any non-Apple modem or proof of purchase of a non-Apple modem. The dealer will replace the computer's main circuit board with a new one.

Since Apple does not charge the dealer for the new board and even pays him $25 for his labor, the dealer should not charge you for the board swap. The job takes only a few minutes—provided the dealer has a new board in stock—so it should not tie up your computer for more than a few days. Once the swap is completed, the upgraded computer should work with any modem that you can plug into an Apple IIc.

Since Apple started its board-replacement program, some published reports have said that the offer applies only to owners of 1200-bps non-Apple modems, but Apple's Sperry says that IIc owners who have purchased any non-Apple modem—either a 300-bps model or a 1200-bps model—can take advantage of the offer.

Apple has not extended the board-swap offer to owners of modems that bear the Apple label, however. Sperry says that the Apple 300 and 300/1200 modems were designed to work correctly with the original Apple IIc. Tests have shown that the computer works fine with both of those modems, no matter which crystal it contains, she assures.

Apple was the only company I talked to that said its modems worked well with the original Apple IIc. Novation, Transend, and U.S. Robotics all said they had encountered problems when they tried to operate one of their modems with an unaltered IIc. All three companies also said that they had experienced difficulties at speeds of both 300 and 1200 bps.

There was some irony in U.S. Robotics' report that it had experienced modem problems with the IIc, since U.S. Robotics manufactures the modems that Apple sells under its own name. Although Apple declares that the Apple 300 and 300/1200 modems are compatible with the original Apple IIc, no other modems that U.S. Robotics makes can work properly with an unimproved IIc. "As of a couple of months ago, the Apple modems that we made were the only ones that would run with it," says Mark Smith, communications director for U.S. Robotics.

A Chorus of Complaints

When word of the IIc communica-

THE UPGRADED COMPUTER SHOULD WORK WITH ANY MODEM

tions gap began to spread through the computer industry, publishers of telecommunications software joined the chorus of companies reporting IIc-related problems. I talked to several software manufacturers who reported difficulties with unimproved IIc computers. They included United Software Industries, the publisher of the ASCII Express telecommunications program; Transend, the company that manufactures the EasyCom/EasyGo program; and Quark, the manufacturer of Terminus, a telecommunications program for the Apple IIe and IIc.

It came as no surprise that Transend, Quark, and United Software Industries all reported problems in making their telecommunications software work properly with non-Apple modems connected to unimproved IIc computers. In addition, however, Transend complained of another, completely different IIc-related problem. This difficulty, as reported by Transend and confirmed by Apple, is that pin 2 of the connecting cable that comes with the Apple IIc is not connected to pin 7 on the output port of the Apple 300/1200 modem. If this pin were connected, it would supply a carrier-detect signal to the Apple IIc. The simple connector device illustrated below will remedy this problem.

Quark, the publisher of the Terminus telecommunications program, reported still another problem with the Apple IIc—and later discovered that

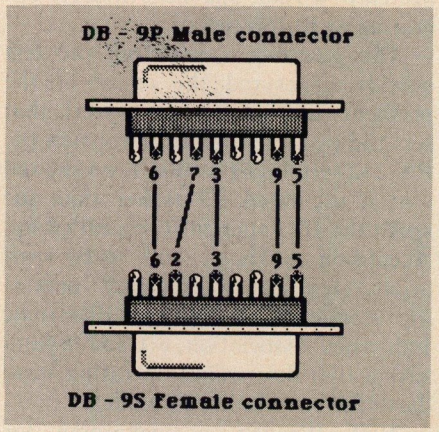

Figure 1: The DB-9P male connector plugs into the Apple modem and the DB-9S female connector attaches to the IIc modem cable.

the cause of the problem was not the IIc, but its own Terminus program.

In the midst of the flurry of complaints about the IIc's telecommunications problems, Quark released a statement saying that the sluggish crystal in the original Apple IIc sometimes prevented the Terminus program from working properly, no matter what kind of modem was in use. When Terminus was used with an unimproved IIc, Quark said, the program sometimes failed to perform automatic log-ons properly. Instead, Quark complained, the program sometimes simply hung up and stopped, bringing communications to a sudden halt.

Several weeks after it had issued its complaint about the Apple IIc, Quark said that it had made an error and that the Terminus program's log-on problems were caused by the program itself, not by the sluggish crystal in the original Apple IIc. Bill Wasmond of Quark says the company has recently discovered that Terminus sometimes runs too fast, so fast that host computers have trouble keeping up with the signals it sends out during automatic-log-on operations.

The host computers that Terminus leaves in the dust are most often those operated by the popular CompuServe database service. When subscribers log on to CompuServe, CompuServe usually requires them to send a Control-C character from their computer keyboard. Most telecommunications programs have no difficulty sending Control-C characters automatically, but Quark's Terminus program does—at least as far as CompuServe is concerned. Terminus sends out Control-C codes so rapidly that CompuServe's computers sometimes miss them.

Some techniques exist for slowing the Terminus program down during log-on operations so that it can log on to CompuServe and other databases without hanging up. Quark has a help line that its customers can call to find out what those techniques are. ✚

Mark Andrews is a writer specializing in computers and electronics, whose articles and syndicated columns have appeared in hundreds of newspapers and dozens of magazines. He is the author of 13 books, 7 of them about computers. His latest book is Apple Roots: A Guide to Apple Assembly Language, *being published by Osborne/McGraw-Hill.*

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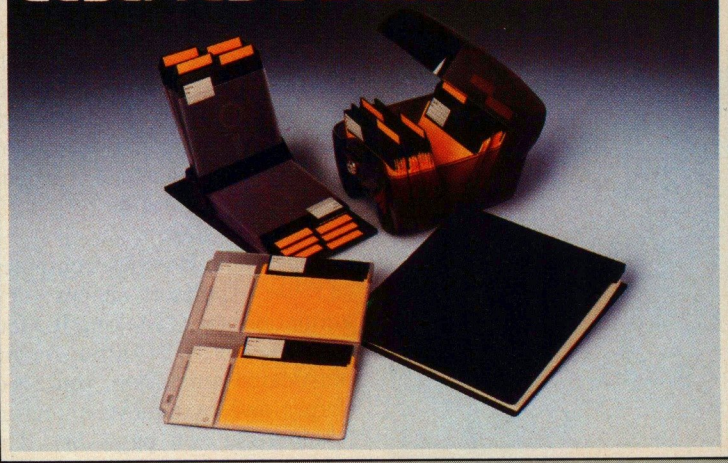

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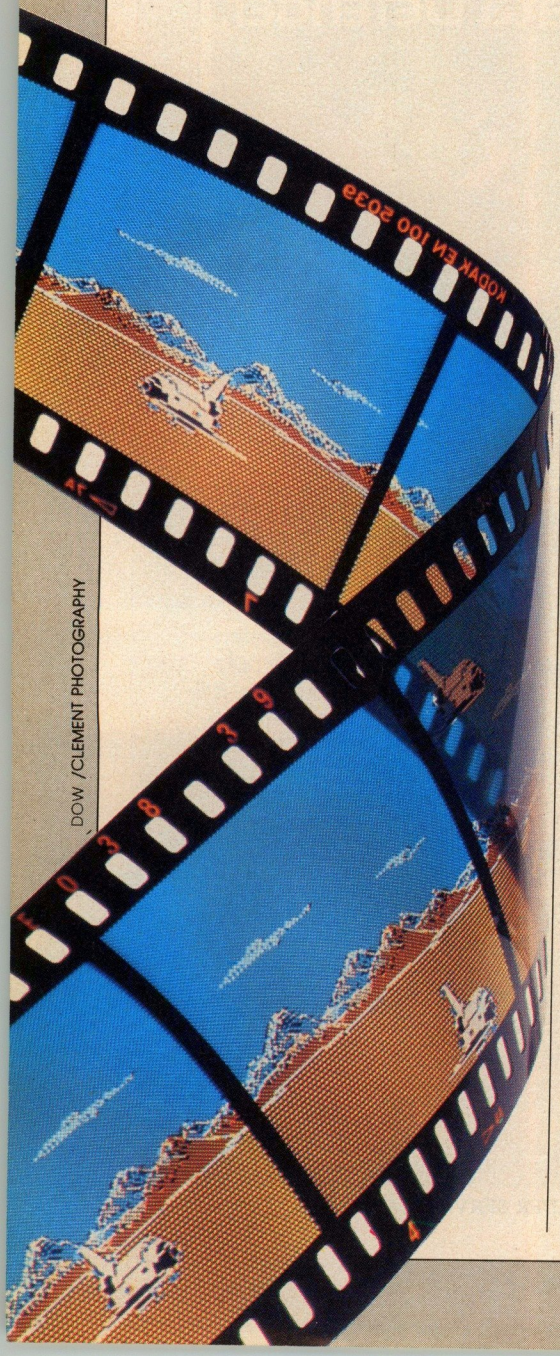
PART TWO:
AN INTRODUCTION TO APPLE ANIMATION

MAKING IT MOVE



DOW /CLEMENT PHOTOGRAPHY

Were your clients bored and stiffly polite when you showed them a bar chart illustrating increased sales? Did your students lean back in their chairs and yawn when you handed out a diagram of a combustion engine? Does the title screen of that program you just wrote lack pizzazz? Are your graphics dull? Liven them up. Make them move! Use your Apple computer to create dynamic animated presentations.

Apple Animation

On Apple-II-series computers, you can use Applesoft shapes for simple animations (see "Making It Move, Part I," *A+*, April 1985), but for more sophisticated animation, you need block shapes and byte-move animation (see "Animation" on page 78). This presents a problem if you aren't an accomplished programmer, because Applesoft doesn't support block shapes, and to attain the necessary speed, routines must be written in machine language. Fortunately, some excellent commercial programs exist to help us.

THE GRAPHICS MAGICIAN

The Graphics Magician is the package to use if you want to create arcade-type game animations or animated high-resolution pictures. The software consists of a set of graphics editors and machine-language routines that help you create animations within your own BASIC programs. The disk contains two utilities: The Animation System and The Picture System. You can use both utilities for animated effects. *A+* reviewed The Graphics Magician in the May 1984 issue (pages 58–60), so we'll just give you a brief description of the program.

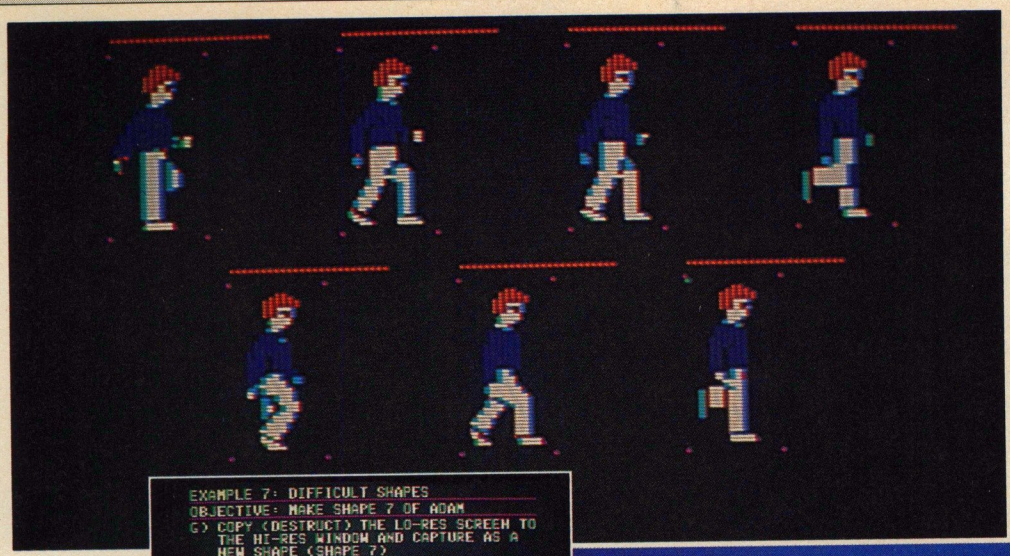
Shifted Shape Animation

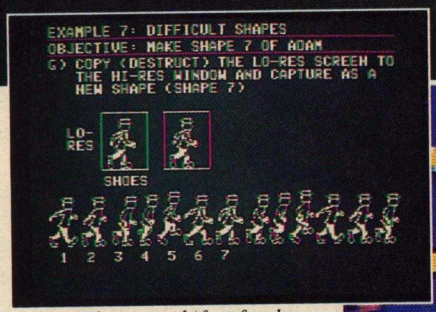
The Animation System lets you create the shapes you need (seven shifts that are automatically compiled) in the Shape Editor (see figure 1), draw paths for the shapes to move in with the Path Editor, and assign shapes to paths—as well as the starting locations—in the Animation Editor. The Animation Editor then allows you to save a complete animation file, consisting of the machine-language animation routines, shapes, paths, and associated tables, onto your own disk. From your own program, you can load the animation file and call it each time you want to advance one step in the animation. A simple and effective animation can use just a three- or four-line BASIC program; for truly dynamic animations, however, you'll have to deal with x,y coordinates, Draw, Xdraw, calls, shape indexes, flags, and so on. The documentation provides you with all the information you need.

Full-Screen Animation

The Picture System is a utility that stores in a Text file the moves that you make as you create hi-res images (for example, plot brush at 10,20). When you save your picture, it's the moves that are saved, not the finished image. The Text file takes up considerably less room on a disk than the 33 or 34 sectors required for a standard hi-res image. You can fit close to a hundred pictures on a single disk. When you display your picture, you see it redrawn exactly as you drew it—like a television instant replay.

The Picture System, although not originally conceived as an animation program, has become one—thanks to the ingenuity of a few Apple graphics artists in New York. Working on a graphics presentation, they discovered a new use for this utility, which was offered as a disk-space saver.





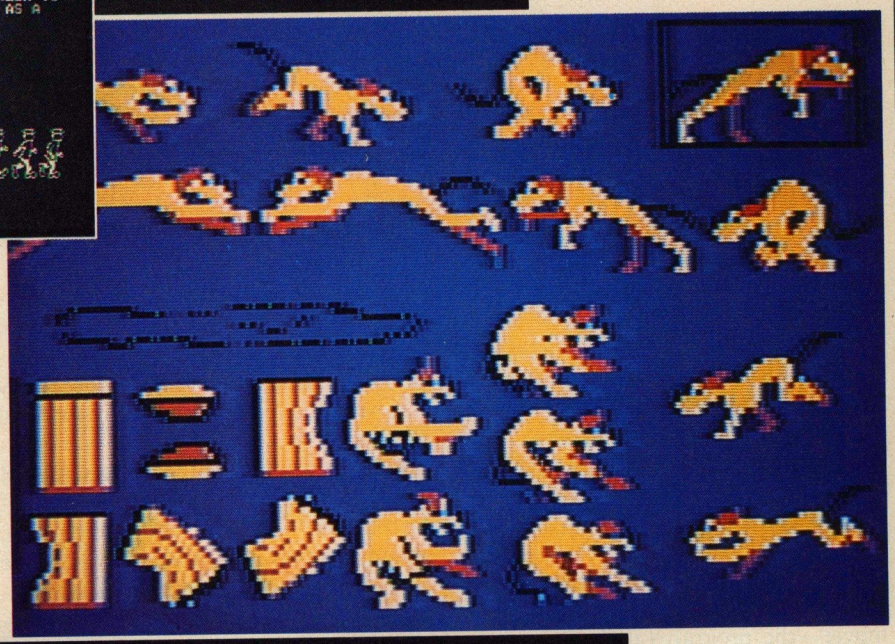
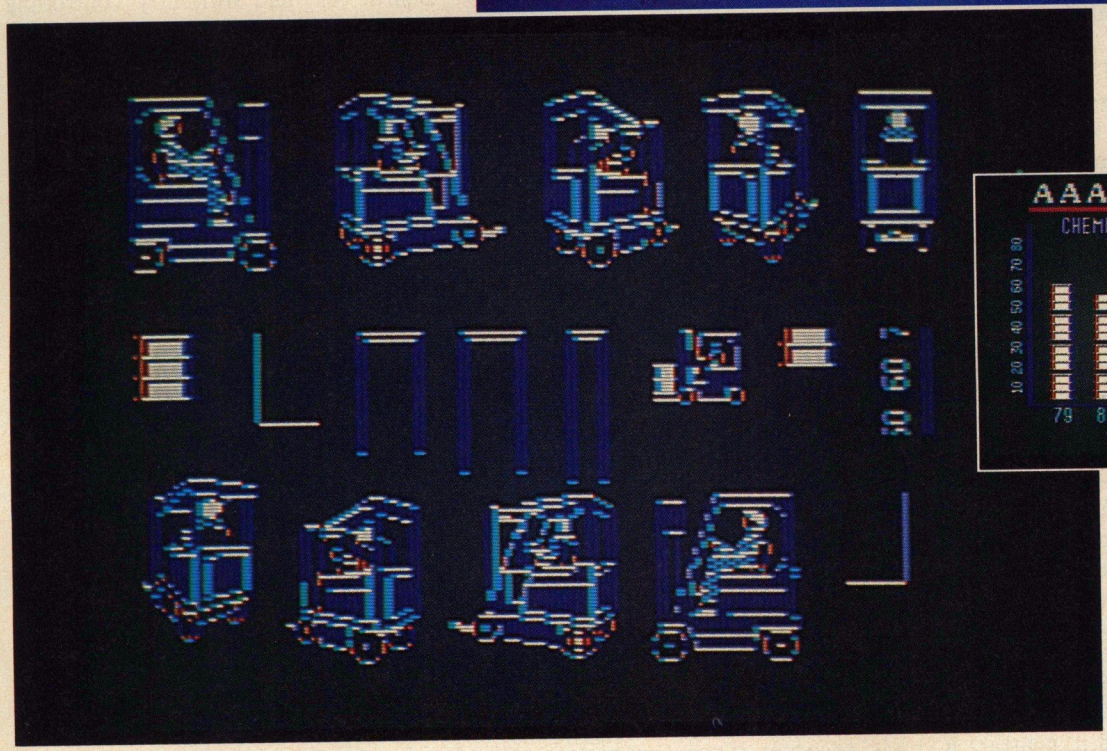


Figure 1 (top): The seven shifts of a shape being created in the Shape Editor from The Graphics Magician's animation system.
Figure 2 (above): Part of The Graphic Solution's disk tutorial, which explains how Adam, one of the demo "actors," was created
Figure 3 (right): A sample animation from Movie Maker



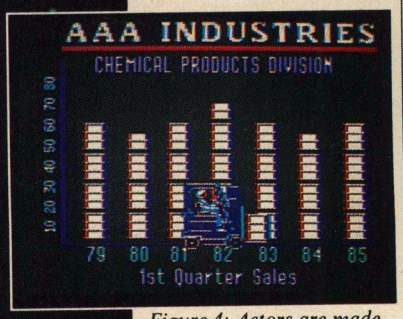


Figure 4: Actors are made by cutting out "snapshots" from hi-res pictures. Frames of actors create scenes, and a movie is made from one or more scenes spliced together. The scene above is from a Take 1 demo movie that uses animation in a business presentation.

Since every move (line, color, plot, and so on) is recorded, you can animate your images by planning the sequence of your moves. For example, if you draw an open eye, draw a closed eyelid over the open eye, redraw the open eye, close it, and so on, when the drawing is "played back," the eye seems to blink. You can add text to the screen at any time. Put words on, take them off, put them on—flashing letters, moving letters. The Picture System's unique, albeit time-consuming, picture-painting process allows you to do full-screen animation, and its potential is limited only by your imagination.

Double-Hi-Res, Too

A double-hi-res version of The Picture System is available in a separate package called Picture Painter. Sequential pictures made with the standard hi-res package easily convert to double-hi-res pictures.

Using The Graphics Magician

The Graphics Magician isn't copy-protected, and purchase of the software gives you unrestricted use of the copyrighted routines, as long as you obtain a license for commercial use. The license is free, but it requires that Penguin receive credit.

Frame Animation

Three animation packages, The Graphic Solution, Movie Maker, and Take 1, simulate traditional film-animation techniques. Although the concepts are the same in all three—draw images, capture them as shapes, create frames, and sequence the frames into a movie—the programs differ in ease of use.

THE GRAPHIC SOLUTION

Kudos to The Graphic Solution (commonly referred to as TGS) for being the first Apple-computer package that allowed us to develop "actors" and sequences of frames to create "movies."

First and Still Going Strong

TGS is a powerful animation utility. (See *A+*, February 1984, for a comprehensive description of the program.) You create bit-map shapes, using keyboard commands, and capture the shapes into frames. You save a series of frames as a sequence and show these sequences via a "projector."

You can draw your shapes with any hi-res graphics utility, bring the screen into TGS, and capture the shapes from the screen (including text in the frames, if you wish), or you can create shapes within the program using the low-resolution shape editor. The shape editor contains options to edit a shape in a number of ways: expand it, contract it, scroll it, create a mirror image of it, and so on—all with a few key presses.

Thoughtful Extras

This package has many unique features, including an option to print the screens as you're working on them, simply by pressing a few keys. This utility is a welcome one for keeping records on the creation of your animation. Another option lets you save a series of steps as a "macro." An example might be move left, shoot a frame, move up, shoot a frame . . . . When you press the designated key, the program automatically carries out all the steps. This option saves a lot of time and tedium.

Supplementary software, called expansion modules, is available for TGS. These programs let you use TGS with Koala Technologies' Gibson Light Pen or the KoalaPad.

Superb Documentation

Working with the TGS manual and the on-screen tutorial is comparable to having a tutor at your side (see figure 2). We were able to animate a simple shape in less than an hour, although it takes considerably longer to learn to animate some of the more elaborate figures. Advanced sections in the manual teach you how to use TGS for multiple-shape animation, animation with big objects, 2-D/3-D graphs and charts, animation on colored backgrounds, and so on.

Using TGS

The Graphic Solution is a complete package. You can save the sequences and the projector onto your own disk and show your files with a simple BASIC program. If you want to prepare an elaborate presentation, the manual gives you detailed instructions for controlling, from your own programs, the projector and your files. Purchase of the software, however, does not give you license to use its routines commercially. To do so, you'll have to contact Accent Software.

MOVIE MAKER

Movie Maker, in concept, is similar to TGS, but simplified. It has fewer commands to learn and a less complicated structure. Still, we had difficulty learning to use Movie Maker, which we attribute to the confusing documentation. The foregoing may sound like a contradiction, but we spent close to three unnecessarily frustrating hours trying to create and animate a shape before we discovered how easy it was to use the program.

The disk we received worked on our Apple IIc computer, but it failed to boot on the Apple II Plus. When we called Interactive Picture Systems, we learned that this problem exists with many of the disks. To obtain a free replacement, send the original disk to Prentice-Hall, which published the program under the Reston label.

A Direct Descendant

Movie Maker, originally created for Atari computers, doesn't take advantage of Apple features. Filenames must be eight letters or less, and they can't have spaces or punctuation marks. Input can come only from a self-centering joystick in combination with the keyboard. We had difficulty controlling shapes with an Apple joystick. Almost all functions require going back and forth between moving the joystick, pressing joystick buttons, and using the keyboard. When you get the shapes where you want them, you have to go to the keyboard to issue commands. For example, to duplicate a shape, press W to create a window, use the joystick to position the window over the shape that you want to duplicate, type D to make a duplicate image, use the joystick to move the duplicate, press the joystick button to deposit the new image, and then type O to define it as a shape.

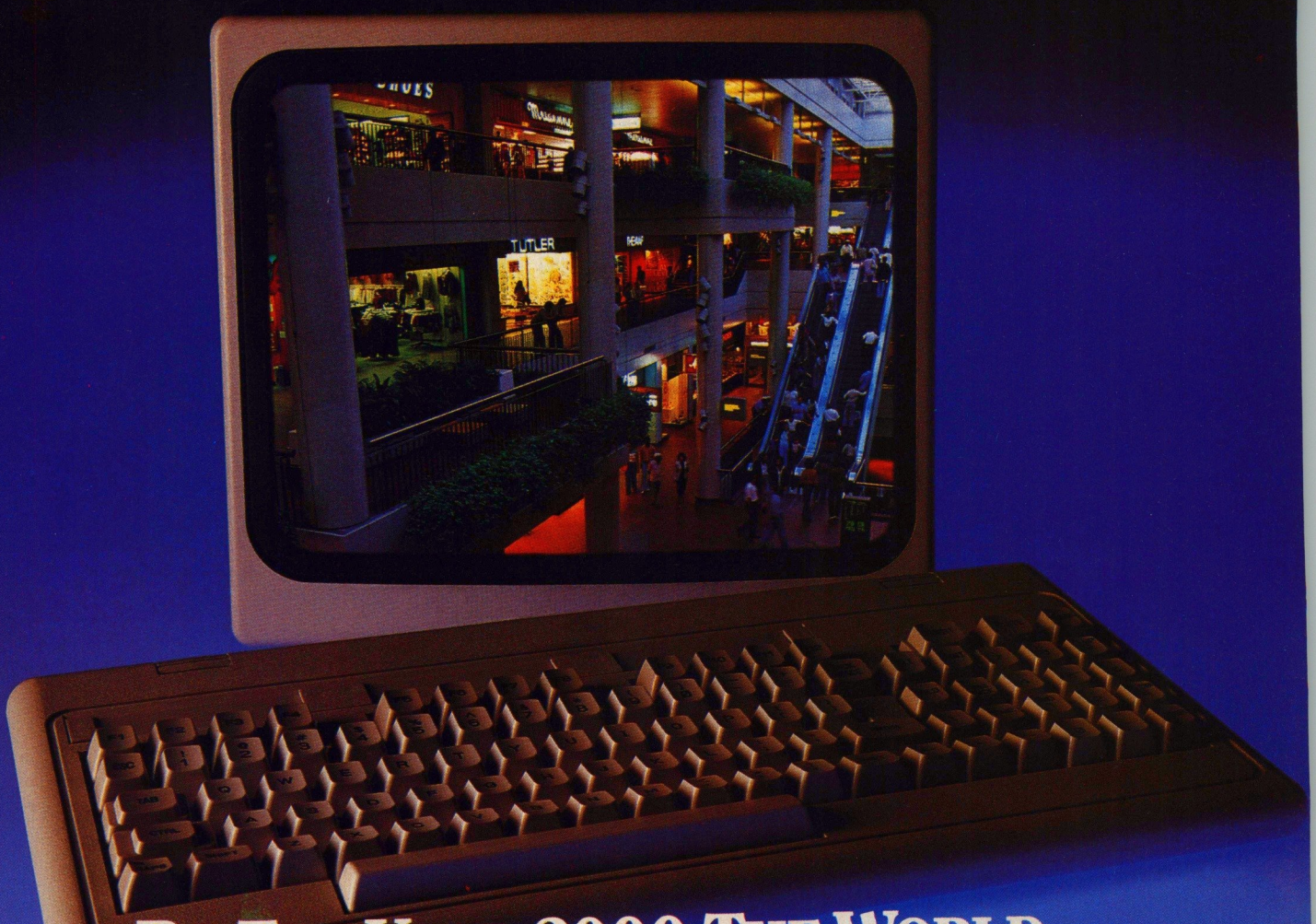
Hang In There

Once you get going, you should have no problem creating fascinating animations with Movie Maker. The sample animations on the back of the disk demonstrate the potential of this program (see figure 3). You can have up to six moving actors on the screen at one time, which should be adequate for beginning animators.

In the Compose mode, you use a

▶ ANIMATION

Animation is an illusion of movement that can be created because of the phenomenon of "persistence of vision"—our eyes retain an image for a split second after that image has been removed from sight. In an animated film, an image is drawn or photographed frame by frame. The position of the image is slightly altered in each frame so that when these frames are rapidly projected, the image appears to be moving.



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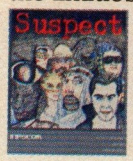

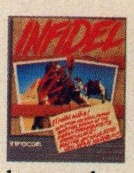

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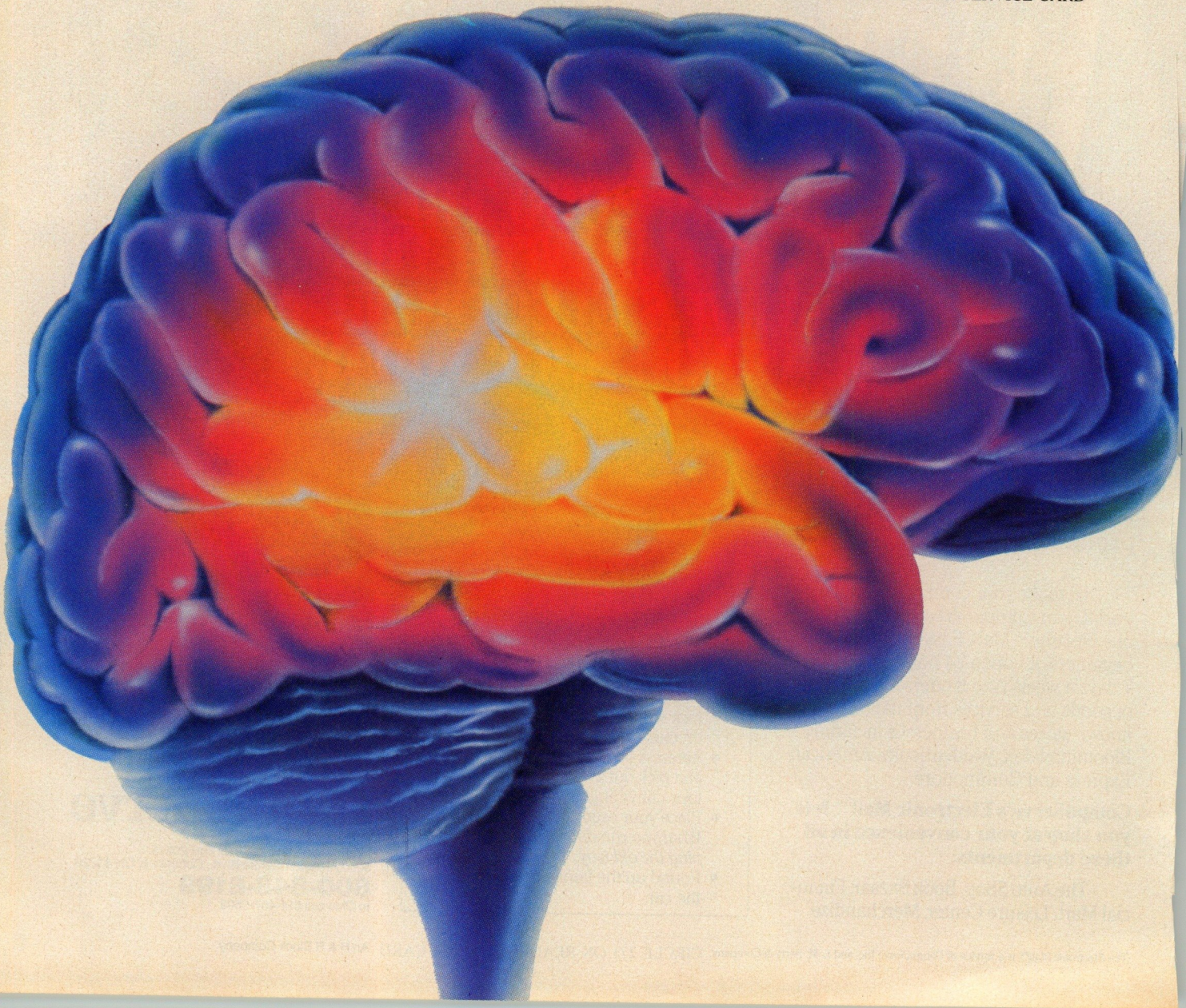

joystick to draw shapes or capture them, draw backgrounds, and insert color. You can duplicate your shapes, flip them, magnify them for editing, and so on. In the Record mode, you combine shapes into sequences, add titles and other special effects, and record your animation file. The Smooth mode is where Movie Maker eliminates flicker and turns your animation into a Movie Maker file. The Play mode shows your movie.

Interactive Picture Systems plans to make free animation libraries available via CompuServe. Starting in March, you'll be able to download these libraries of shapes, sequences, and finished animations for use with Movie Maker.

Using Movie Maker

You can't use animations created with Movie Maker from within your own programs. You can, however, copy the auto-play programs from the back of the Movie Maker disk, thereby creating your own auto-play disk that will boot by itself and play your movie files. For program development, you must license the Movie Maker Professional System directly from IPS.

TAKE 1

Take 1 is the newest and easiest animation package. From the menu, you select Actors and Actions and cut out objects from hi-res pictures to make actors. Select Scene Editor to cast your actors into a series of frames and then choose Movie Editor and put one or more scenes together with backgrounds to make the movies. Use Movie Projector to show your movie.

Full-Featured and Effortless

Take 1 is menu-driven and uses the keyboard for input. Once you've read the short manual and spent an hour or two experimenting, you'll be ready to go. Create your background scenes and characters by drawing them on the hi-res screen with any hi-res utility. Then load the screen of characters into Actors and Actions. Here you can edit the characters and take "snapshots" of them, so they become actors. Actors can have predefined movements, called "actions," which you can add at any time. The background scene gets loaded in, and up to eleven actors can be "cast" in the Scene Editor. You make the actual movie in the Movie Editor, where one or more scenes are spliced together (see figure 4).

Pause for Sound

You can add three different pause elements to your movie. The first type of pause stops the actions at a given frame and waits for the viewer to press a joystick button or the Return key. The second type of pause is a selected time delay. The third pause lets you insert a sound effect after a frame. Ten sounds are available: click, pop, footstep, beep, double beep, crash, explosion, ray gun, slide up, and slide down.

Sprites

This option allows you to capture the actors (i.e., shapes) with transparent areas in them so that, for example, if a car is moving, the background would be seen through the windows.

Text

After loading a character set, you can add text to the scene. Once you add a line of text to the scene, you can use it in much the way as you use an actor.

Film Libraries

Disks of Take 1 animations can be purchased separately. These disks contain actors, actions, and sequences that you can use with your own animations. The animations are the creations of the animator who did the Movie Maker demos, and they're just as inspiring.

Using Take 1

To see a movie created with Take 1, use the Projector on the master disk; you cannot transfer the Projector to your own disks. Supplementary software, in the form of the Animation Toolkit, should be available by the time you read this article. The toolkit program is an enhanced graphics language that's keyed into Take 1; it allows you to use the movie files directly from BASIC via the ampersand hook. For those who prefer it, a machine-language version will be available also. You'll have to contact Baudville for commercial licensing requirements.

This One or That One?

No matter which software you choose, please remember this: No animation program does all the work for you. Animated presentations must be planned, "storyboarded," and drawn. From concept to completion, these programs give you the tools, but they can't give you the commitment or the skills.

What type of animations are you interested in, and what do you want to use them for? If you need the programs for commercial projects, check the licensing requirements from each manufac-

▶ BLOCK SHAPES AND PRESHIFTED SHAPE ANIMATION

Unlike vector shapes, which require the computer to read and translate the plotting directions for each vector of a shape when it's drawn to the screen (see "Shaping Up," *A+*, August 1984), a block or byte-move shape is predefined and then stored somewhere in the computer's memory. Plotting a byte-move shape is a matter of moving the predrawn figure into the desired memory area of the screen. Therefore, a byte-move shape saves time—instead of being regenerated each time it's used, it has only to be moved from another location.

The hi-res graphics screen is a display of approximately 8000 bytes of computer memory. Each byte is eight bits, turned on or off; and only seven of these bits, or pixels, are displayed. Horizontally, there are 40 bytes across the screen—this gives us 280 (7×40) dots across the screen. Vertically, there are 192 bytes. These bytes are stacked on top of one another, so the screen is 192 dots tall.

To create a block shape, store a bit pattern in a set of bytes; when these bytes are stored in screen memory, a character or shape appears. (That's how text appears on the screen.) A normal-size character is seven dots wide (one byte) and eight dots tall.

The fastest way to move things around the screen is by bytes, not bits. Vertically, it's easy to move a shape one dot—you just move it up or down one byte. Horizontally, though, if you move it one byte over, the shape moves seven dots. You can't get smooth animation if your shape is jumping seven pixels at a time. To move in smaller increments, the bits that define the shape have to be shifted over within the bytes, a process that involves "preshifted" shapes.

Preshifted shapes are a type of block shape—they're premoved animations. For every shape you create, seven facsimiles are stored as bit patterns in memory. The bit patterns are the same, except each one is moved over by one dot with respect to the byte boundaries. Seven blocks, or frames, are generated for each shifted shape—each frame is shifted by one pixel from the previous frame. (Because of Apple's odd-even color differences, the frames are usually shifted two pixels to preserve color.)

turer to see if you can comply with the requirements.

If arcade-type games are your goal, you want The Graphics Magician's Animation System. This is the only program, of the four we have reviewed here, that contains the routines and instructions for animating games.

For simple, but effective, full-page animation—in which you don't have to be concerned with shapes or programming—it's Graphics Magician again, this time the Picture System utility. This utility is for hi-res picture animation, illustration of adventure games, stories, and so on. If ease of use is your prime consideration, consider Movie Maker or Take 1; if you intend to use the program with children, make it Take 1.

Providing you're willing to spend time learning and you're not intimidated by lots of keyboard commands, we recommend The Graphic Solution for professional business presentations. It's less structured than the other programs, and it gives you greater control of the options.

All in all—for pleasure, demos, and tutorials—you'll get good results with The Graphic Solution, Movie Maker, or Take 1. Get one of these packages, create some graphics, and enjoy making them move. ✚

Roberta Schwartz and Michael Callery teach computer graphics at the New School in New York City. They have collaborated on several educational software projects and are writing a book on Apple graphics for Prentice-Hall.

▶ PRODUCT INFORMATION

The Graphics Magician
Penguin Software
P.O. Box 311
Geneva, IL 60134
(312) 232-1984
List Price: $59.95
CIRCLE 475 ON READER SERVICE CARD

The Graphics Magician Picture Painter
(double-hi-res)
Penguin Software
P.O. Box 311
Geneva, IL 60134
(312) 232-1984
List Price: $59.95
Requires: Apple IIe or IIc; Rev. B motherboard; Extended 80-Column Card with jumper installed
CIRCLE 476 ON READER SERVICE CARD

TGS: The Graphic Solution
(64K version)
Accent Software
4546 El Camino Real
Suite S
Los Altos, CA 94022
(415) 949-2711
List Price: $149.95 (includes certificate for one expansion module); TGS expansion module, $35
Note: The original 48K version of TGS is available directly from Accent
CIRCLE 477 ON READER SERVICE CARD

Movie Maker
Interactive Picture Systems, Inc.
270 Park Avenue South
New York, NY 10010
(212) 475-7053
List Price: $49.95
CIRCLE 478 ON READER SERVICE CARD

Take 1
Baudville
1001 Medical Park Drive S.E.
Grand Rapids, MI 49506
(616) 957-3036
List Price: $59.95; Animation Libraries, $30
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4. THE CALCULATOR: Turns your Apple into a four function printing calculator with memory and percent.
5. THE SAVINGS ANALYZER: Compute the future value of savings, IRA's, and investments in moments with The Savings Analyzer.
6. THE WAGE ANALYZER: Analyze your income by the hour, time & ½, weekly, bi-weekly, semi-monthly and annually. Calculate increases or decreases by amount or percent. Printout provides a great way to present pay raises to employees.

Greg Glau of InCider says: *"Borrowing money is no problem with the loan analysis section to guide you. Work Force II is easy to understand and operate. It's an honest value..."* June 1984

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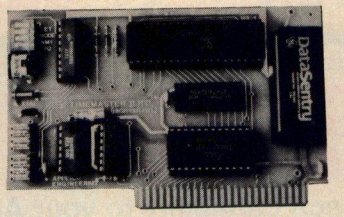

- Appleworks will now time and date stamp all your data automatically.
- Compatible with ALL of Apple's languages. Many sample programs for machine code, Applesoft, CP/M and Pascal on 2 disks.
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H.O	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

Full emulation of all other clocks. Yes, we emulate Brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us. The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card.

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VIEWMASTER	139	YES	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEX	MORE	NO	YES	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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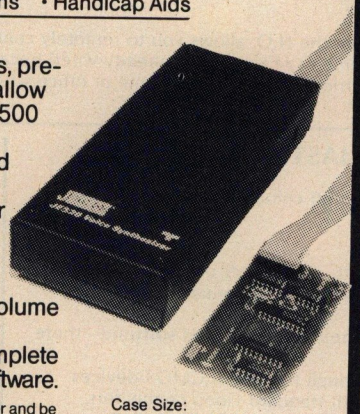

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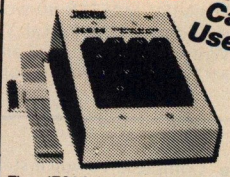

The JE614 is a newly introduced numeric/auxiliary keypad for the APPLE *IIe*.* It offers the flexibility of a 10-key pad and the convenience of 23 directly accessible functions. Screen manipulating functions make word processing a snap and cursor controls make the keypad ideal for VisiCalc** users. The JE614 Keypad is housed in a durable metal enclosure and is color-coordinated with your APPLE *IIe* computer. Operation of the keypad can begin within minutes from unpacking. Special functions include: Home, Clear, Clear to End of Screen, Scroll-Up, Scroll-Down, Tab, Delete, Left, Right, Up and Down. Each key has autorepeat. Size: 5⅞" L x 4-3/16" W x 1¼" to 2½" Slope.

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MONEY MATTERS
BY KEN LANDIS

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TO BUY OR TO LEASE

According to singer/composer Ronnie Milsap, "She loves my car more than she loves me . . ." Adolescent you say? Maybe, maybe not. Ever since a generation read *On the Road* by Jack Kerouac, we have wanted to get in the car and go.

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Lease or Buy?

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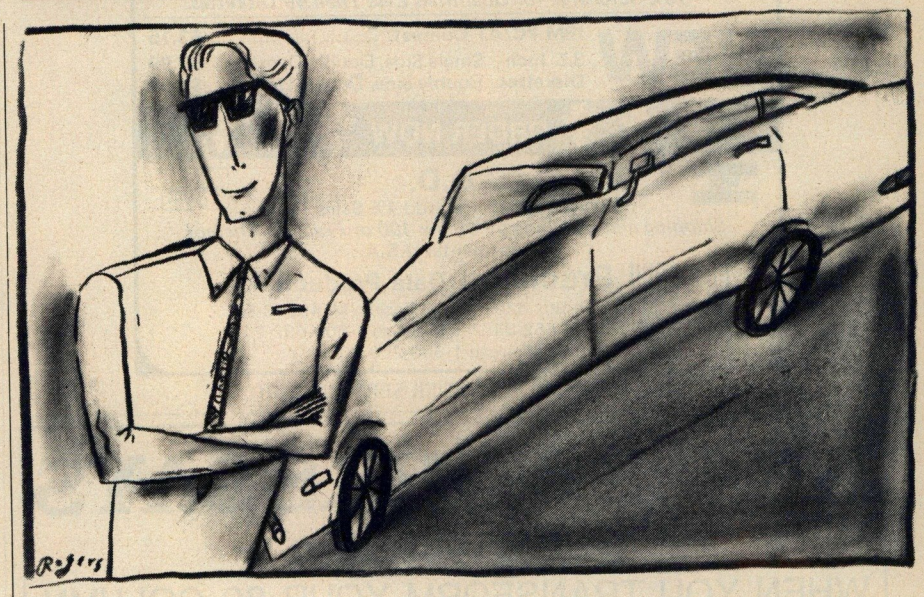
To find that answer, we are going to use your high-horsepower, low-mileage Apple and the Financial Cookbook from Electronic Arts.

The Answer in a Cookbook

If you remember the "Money Matters" column on Clifford Trusts (*A+*, November 1984, pages 161–167), then you will remember the Financial Cookbook. The Financial Cookbook is a family of programs that deal with commonly asked financial questions, but the programs themselves are far from common. It is a well-executed software package, and, for only $50, it is an uncommon investment—and that's why



Mr. and Mrs. M.G. Backfire bought it.

Mr. Backfire repairs flashlights for a living, and his wife raises the little Backfires (two in all). To help him do his work, Mr. Backfire's employer provides him with a truck. He has never owned a car before, but now he wants to buy one to visit the place of his boyhood dreams, the Flashlight Hall of Fame in Eveready, Pennsylvania. Mr. and Mrs. Backfire want to know whether they should lease or buy the car. Let's look at their analysis.

The price you pay is between you and the salesman, but the way you finance the car is up to you.

Great Decisions Every Time

Mr. Backfire is using recipes (programs) 31 and 32 of the Financial Cookbook, which deal with buying vs. leasing your car. First, he considers buying.

To do the analysis, he has to assemble some information, including the purchase price of the car, the amount he will finance, the length of the loan in years, the loan interest rate, the car's estimated value when he decides to sell it, the number of years he plans to own the car, the investment-tax credit he can take based on business usage, any business deductions, the interest rate his money can earn in the bank, its compounding period, and his marginal tax bracket.

A Little Help Doesn't Hurt

He knows some of these pieces of information, but he doesn't have the foggiest idea about some of the others. He can calculate his marginal tax with the first Financial Cookbook recipe, but he defers to his Uncle Wilfred the accountant on the questions relating to business expenses and the investment tax

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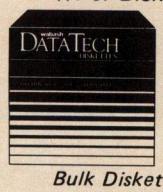

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CIRCLE 149 ON READER SERVICE CARD

credit he can deduct.

You've just learned that Mr. B. is buying the car to take a vacation in, so where do business expenses come in? Mr. B. believes that he will use the car occasionally for work, especially when he makes house calls, but he isn't sure if the usage will qualify for a deduction. Based on what he tells his uncle, the answer is that he can deduct 10%.

If you don't have an Uncle Wilfred, then consult an accountant or tax adviser on this and other questions. Be advised that as of January 1, 1985, you must keep a written, "contemporaneous" log of all business-related usage and expenses for your car. Without it, nothing is deductible.

The First Course

Mr. B. enters the correct information into the Financial Calculator, and almost instantly he has the answers for his buy analysis. He has a problem, though—he doesn't know how to interpret them.

The first answer is the tax credit he can expect if he buys the car. The software computes the tax credit by multiplying the purchase price of the car by the tax-credit percentage and then by the business-deduction percentage. This amount represents a dollar-for-dollar reduction in federal income tax.

The Financial Calculator then gives Mr. B. some bad news. It computes his estimated monthly car payment, based on the amount he intends to finance. It's not the program's fault that no matter what he does, the payment always seems too high.

The program then figures out what his depreciation-tax savings will be (it assumes he bought the car in January). Because, as far as deductions are concerned, Mr. B. is using the car for personal use 90% of the time, his depreciation-tax savings (and investment-tax credit) will be $7 per month.

Because Mr. B. itemizes his deductions on his personal-income-tax return, the next calculation, interest tax savings, is important because he knows that it will be deductible for him and anyone else who itemizes. The Financial Cookbook multiplies the interest portion of his yearly loan payment by his marginal tax rate. The result is what he will save on his income taxes because of the interest he paid.

When you consider any purchase, investment, or expenditure, you have to consider taxes. Often a decision depends on a comparison of the cash-flow cost of an item and its net-of-tax cost. A car is no exception. The monthly pay-

ment on the car is a cash-flow cost; the net monthly expense (an item the Financial Cookbook figures out) is the monthly cash payment, less the tax savings. The net monthly expense is the "true" cost of the car. To afford a car, you have to be able to handle the monthly cash-flow payment first and the "true" cost second.

To help you figure out if you can afford a car, the Financial Cookbook computes the total cash payments on the car, the total tax savings, the amount you will owe on the car when you sell it, and the net total expenses.

The final computation is the most important, as it is the present value of all purchase costs. Simply stated, a dollar today is worth more than a dollar tomorrow, because to borrow money you have to pay interest for it, and when you lend money, you collect interest income. The present value of all costs tells Mr. B. the total cost of buying the car in today's dollars. This number is the one he will use later to compare buying to leasing costs.

One thing the Financial Cookbook does not account for is sales tax, which, like interest, is deductible. To take it into consideration, Mr. B. simply adds the sales tax to the purchase price of the car and then multiplies the sales tax on the car by his marginal tax rate. He then deducts the result from the present value of his net expenses.

The Second Course

Recipe 32 will give Mr. B. the present value of all his potential lease costs, which he can then compare to the present value for buying before making his decision.

The net monthly expense is the monthly cash payment, less the tax savings.

The ingredients for this recipe are the initial lease payment (typically larger than the monthly payment), the monthly payment, the number of payments, the final payment (which is also usually larger), the percentage of the tax credit Mr. B. expects to take for business use of the car, the percentage of the expenses of the car he estimates will be for business, the interest rate he can get on his money (bank account, money-market funds, CDs, and so on), the number of compounding periods, and his marginal tax rate.

As you can see, much of the information is the same. If so, how can there be a difference between leasing and buying?

Percentages

The majority of the answer lies in the percentage of car use that will go for deductible business purposes. In a leasing situation, if Mr. B. uses his car for business 50% of the time, then 50% of the payments and 50% of the expenses of operating the car are deductible. If Mr. B. is in a 30% marginal tax bracket, .3 (30%) times 50% of all his payments and expenses will represent dollar-for-dollar reductions in his federal-income-tax liability.

If he bought the car and still used it 50% of the time for business, then the interest on the car loan, no matter what percentage of the time he used the car for business, and 50% of his expenses (operational and depreciation) would be deductible.

In this example, if Mr. B. bought the car and the combination of his interest, depreciation, and operational expenses were greater than 50% of his total monthly loan payment, assuming that his monthly loan payment would be larger than his lease payment, then buying would probably be better. If not,

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A/D SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, −10 to 0.

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D/A SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- On-board output buffer amps can drive 5 MA
- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 MS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

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leasing would look good.

Many other factors can weigh into the decision, including the value of the car at the end of the ownership period (for buying, the higher the better), the difference in the size and timing of the payments, the up-front costs (sales tax) when buying and so on. But the most important consideration is Mr. B's deductible business usage of the car.

Instant Analysis

Mr. B. again enters the necessary information into the Financial Calculator, and almost instantly he has his answers. The results are the total cash payments, tax savings, and total net expenses. (He and you need to make sure that the lease is an operating lease, not a capital lease. A capital lease is treated differently.)

Mr. B.'s bottom line is again the present value of all the costs, except that this time they are for leasing. With a lease, Mr. B. does not have to pay sales tax on the purchase cost of the vehicle, so he doesn't need to adjust the present value of leasing costs.

The Finished Product

Which number is larger, the present value of buying or the present value of leasing? Whichever one it is, it represents the method that Mr. Backfire should reject. The *lower* the present value of the costs, the better.

What, then, should the Backfires do? Take a look at Mr. B.'s analyses (figure 1). Based on this information, he should opt for buying. Notice that Mr. B. didn't deduct his income-tax savings from sales tax (marginal rate times sales tax) in the buying analysis because even without this additional reduction in cost, buying was less expensive.

As you can see, leasing, contrary to popular opinion, is not always better than buying. As our friend Mr. B. has found, it can be a costly alternative. ✚

Ken Landis has consulted with professional investment advisers and planners on the use of computers since 1978.

▶ PRODUCT INFORMATION

Financial Cookbook
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
List Price: $50
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive

CIRCLE 351 ON READER SERVICE CARD

BUYING ANALYSIS	
Inputs	
Purchase Price	$12,075
Amount financed	$9,200
Length of loan (in years)	4
Loan interest rate %	12
Car's value when sold	$2,500
Years until sale	4
Investment tax credit %	6
Business deduction %	10
Interest rate earned %	8
Compounding periods	365
Marginal tax rate %	28
Outputs	
First month summary:	
Monthly cash payment	$242
Depreciation tax savings	$7
Interest tax savings	$26
Tax credit	$72
Total tax savings	$33
Net monthly expense	$210
Summary	
Total cash payments	$11,629
Total tax savings	$1,081
Down payment	$2,875
Due on sale	$0
Total expense, net	$13,423
Present value, net exp.	$12,227
Present value, purchase costs	$10,302

LEASE ANALYSIS	
Inputs	
First-month summary:	
Initial payment	$500
Monthly payment	$280
Number of payments	48
Final payment	$280
Tax credit %	6
Business deduction %	10
Interest rate earned %	8
Compounding periods	365
Marginal tax rate %	28
Outputs	
Monthly summary:	
Monthly cash payment	$280
Tax savings	$8
Net monthly expense	$272
Summary	
Total cash payment	$14,220
Total tax savings	$404
Total expense, net	$13,816
Present value, lease costs	$12,321

Buying is $2,019 ($12,321 − $10,302) less expensive than leasing.

Figure 1: A comparison of buying and leasing figures

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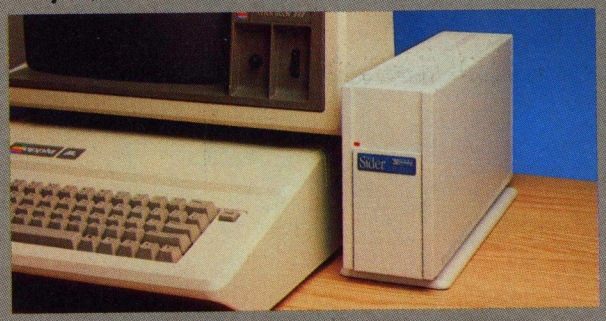

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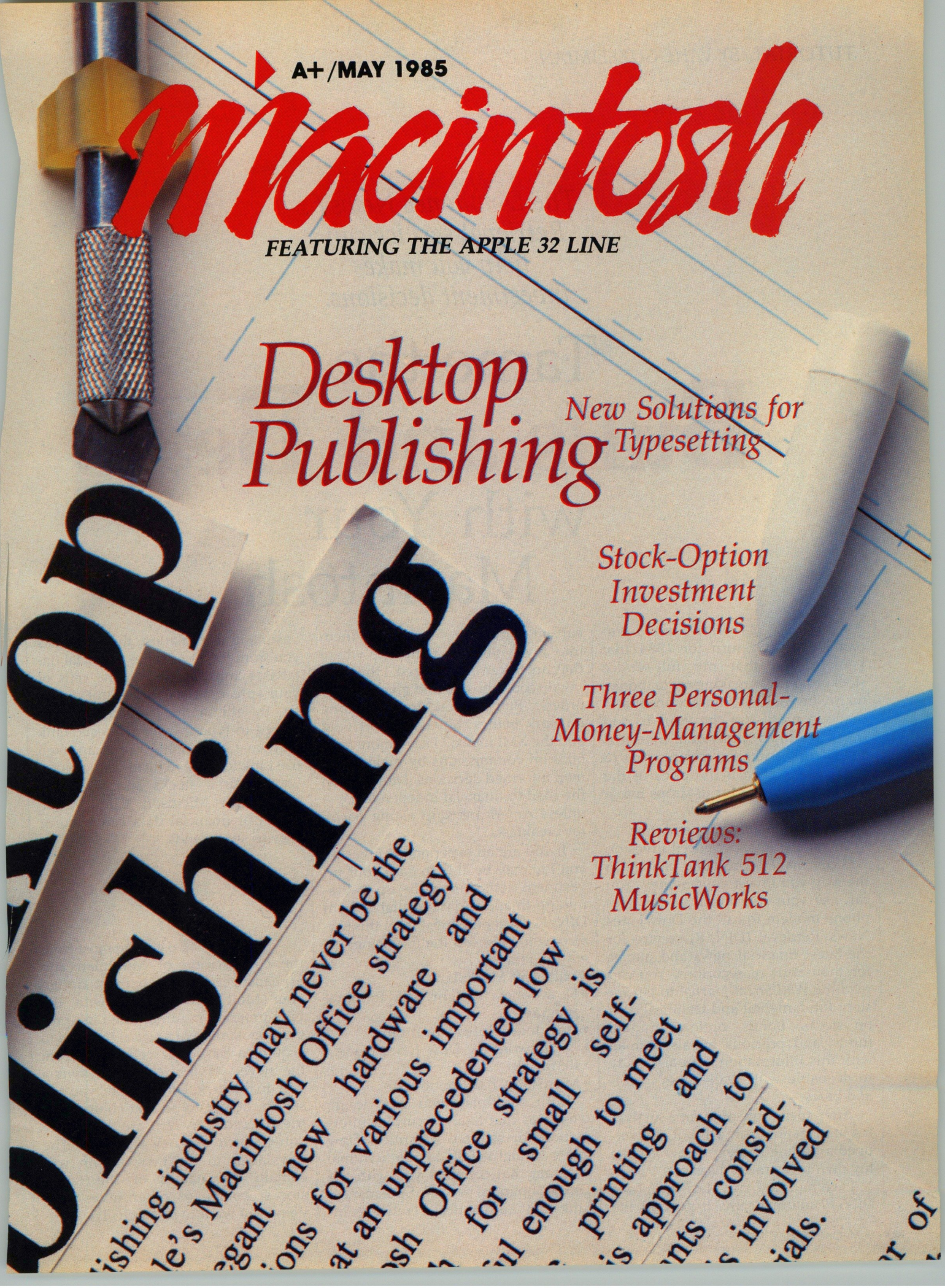

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- Dow Jones Straight Talk terminal program
- Dow Jones Spreadsheet Link
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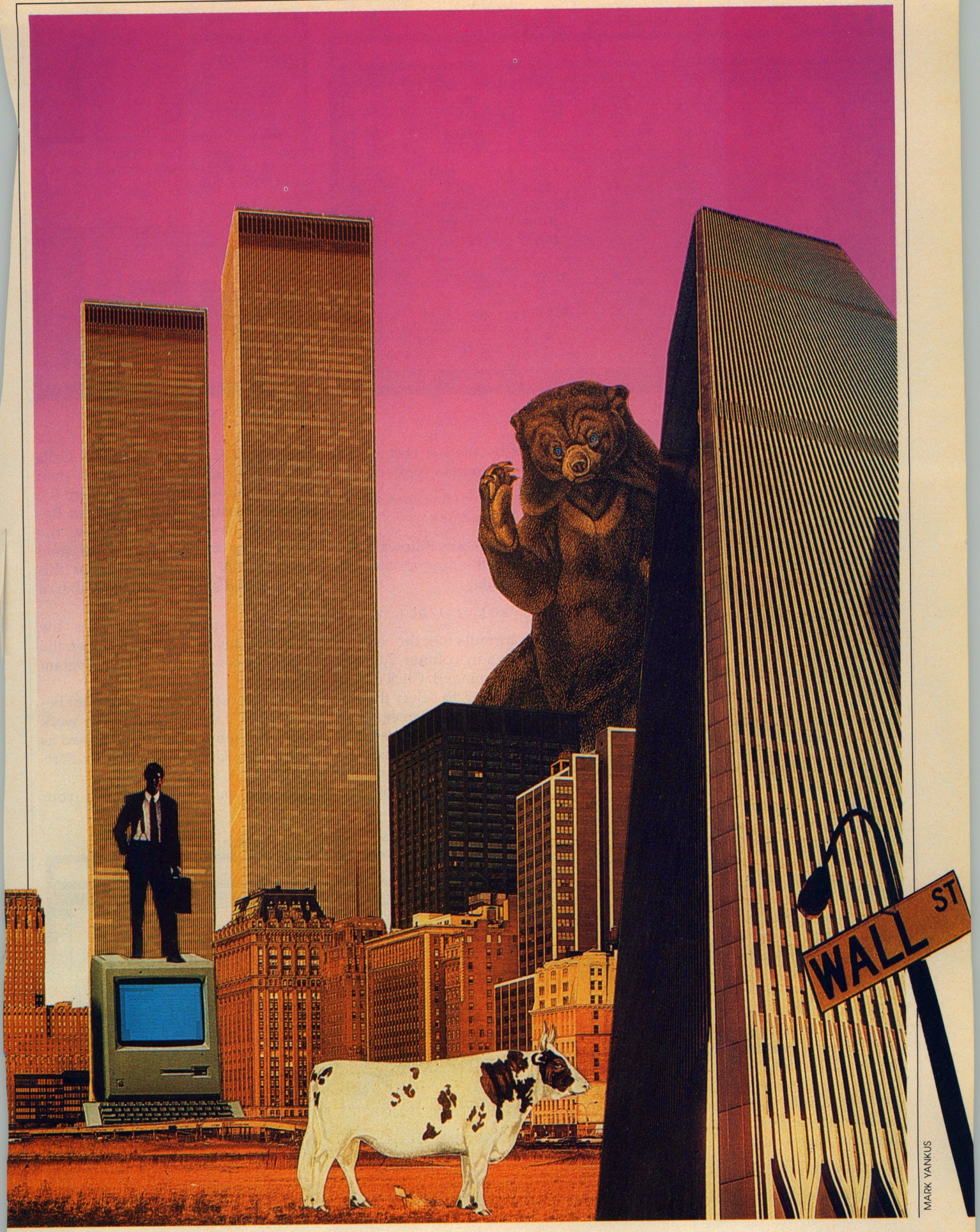
With Multiplan you can design templates that analyze current information for selected securities. Dow Jones Straight Talk is the terminal program that connects you with the DJN/R financial service. Spreadsheet Link can automatically retrieve investment information that interests you from the Dow Jones financial databases and plug it into the cells of your spreadsheet template for analysis. By eliminating on-line time required to type in your requests, Link will save you money. You can even use Link to retrieve historic quotes for your favorite stocks and later plot them with Microsoft Chart. Price charts of financial data can make it easy to spot trends.

To get the most from the combination of Multiplan and Spreadsheet Link, you must design your Multiplan template with the Link program in mind. The Link program must receive a signal that it is to acquire a particular cell entry from the news service. A special syntax will do the trick. For example, you can set up the syntax so that column entries preceded by V— are values obtained from the news service. The row labels in the first column will contain the names of the target stocks, bonds, or other investment items you want to research. The stan-



MARK YANKUS

File Edit Select Format Options Calculate

R17C7

Stock Portfolio

	1	2	3	4	5	6	7
1	STOCK	V-LAST	No. of	CURRENT	NET	GAINS	%
2	SYMBOL	PRICE	SHARES	VALUE	COST	(LOSSES)	CHANGE
3	---	---	---	---	---	---	---
4	V-GM		200	$0	$12000	($12000)	-100%
5	V-AAPL		500	$0	$9500	($9500)	-100%
6	V-IBM		200	$0	$20000	($20000)	-100%
7	V-ATT		300	$0	$5700	($5700)	-100%
8	V-AMD		200	$0	$5000	($5000)	-100%
9	---	---	---	---	---	---	---
10	TOTAL		1400	$0	$52200	($52200)	
11	---	---	---	---	---	---	---
12	AVERAGE	#DIV/0!	280	$0	$10440	($10440)	-100%
13	---	---	---	---	---	---	---
14							
15							

Figure 1: The Spreadsheet Link template

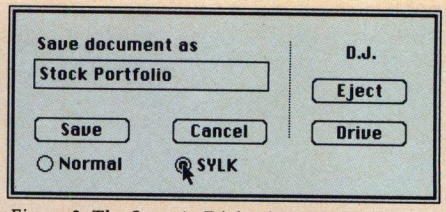


Figure 2: The Save As Dialog box. The Link program can work only with templates that are saved as SYLK files.

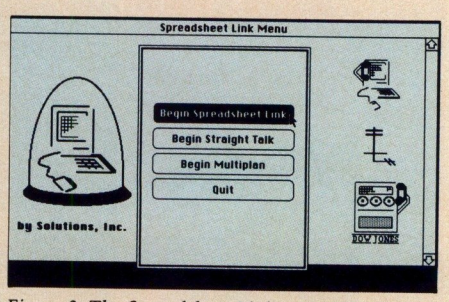


Figure 3: The Spreadsheet Link menu

dard stock-exchange symbols for these items must also be preceded by V—. As a start, enter the simple template presented here. After you master this one, you can enhance it to suit your needs.

First enter the labels for rows 1 and 2 as well as for column 1, as shown in figure 1.

To analyze this information, you need some formulas. To calculate gains or losses, subtract the net cost from the current value, as expressed in this formula.

```
Gains (Losses) = Current Value
— Net Cost
```

Do the following to enter the formula. In row 4, column 6 press =, click on the Current Value cell for that row, press — (the minus sign), and click on the Net Cost cell in the same row. This will give you the formula =RC(—2)—RC(—1). To enter this formula into the other cells in column 6, drag the cursor to select the cells in column 6 for the other stocks. The selected stock cells are highlighted in black. Now choose Fill Down from the Edit menu.

To get the Net Cost total, click on row 10, column 6, and type =SUM(. Then drag the cursor down the cells that are to be summed in column 6. To get the average Net Cost, type =AVERAGE(into row 12, column 6, and drag down the column of stocks. This action gives you

```
=AVERAGE(R[—8]C:R[—4]C)
```

To calculate percent change, divide the difference between current value and net cost by the net cost, which the following formula expresses.

```
Percent Change = (Current Value
— Net Cost)/Net Cost
```

Enter the formula as follows: Enter = and click on the appropriate cells to get the formula

```
=(RC[—3]—RC[—2])/RC[—2]
```

Copy this formula into the cells for the other stocks in column 7, using the Fill Down command. Click on the header of column 7 to select the entire column, and choose Percent from the Format menu. Now enter remaining totals and averages for the cells that require them in rows 10 and 12.

In order to set the number of decimal places to zero, choose All Cells from the Select menu, and then choose Number of Decimals from the Format menu. Type *0*, and press Return. To have column 2 show the price of the shares with three decimal places, click on the header for this column and enter *3* for the number of decimals.

When you have completed the template, save it as a SYLK file on the disk that contains the Link program (figure 2).

This last step is very important because the Link program can work only with templates that are saved as SYLK files. Use the name Stock Portfolio for this sample template.

When you are ready to try your

File Edit Select Format Options Calculate

R17C7

Stock Portfolio

	1	2	3	4	5	6	7
1	STOCK	V-LAST	No. of	CURRENT	NET	GAINS	%
2	SYMBOL	PRICE	SHARES	VALUE	COST	(LOSSES)	CHANGE
3	---	---	---	---	---	---	---
4	V-GM	77.625	200	$15525	$12000	$3525	29%
5	V-AAPL	28	500	$14000	$9500	$4500	47%
6	V-IBM	121	200	$24200	$20000	$4200	21%
7	V-ATT	19.25	300	$5775	$5700	$75	1%
8	V-AMD	29	200	$5800	$5000	$800	16%
9	---	---	---	---	---	---	---
10	TOTAL		1400	$65300	$52200	$13100	
11	---	---	---	---	---	---	---
12	AVERAGE	54.975	280	$13060	$10440	$2620	23%
13	---	---	---	---	---	---	---
14							
15							

Figure 4: The template with values from the Dow Jones News/Retrieval service

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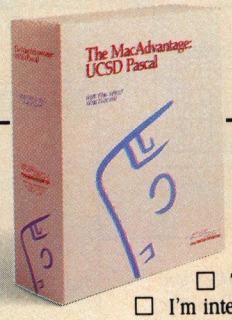

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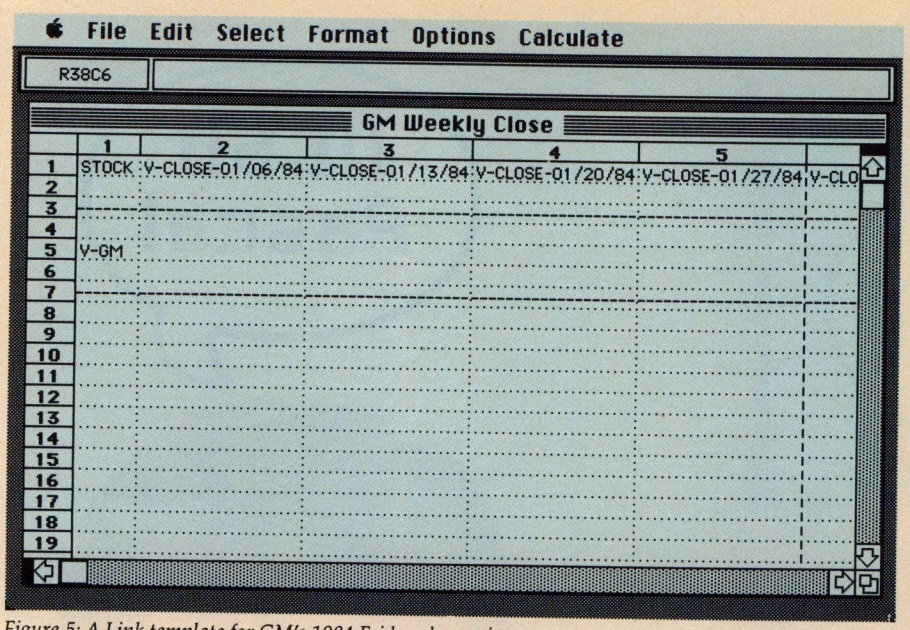

Figure 5: A Link template for GM's 1984 Friday close prices

Link template, double-click on the menu icon from your Link disk. You will see the menu as illustrated in figure 3. You can choose to go on-line with Straight Talk or Link, or you can choose to start Multiplan in order to design more templates. Click on Link from the menu. The program will ask you to choose a spreadsheet template. Double-click on Stock Portfolio. To save you on-line time with DJN/R, the Link has an editor built into it to check your template for accuracy of syntax before it calls the service for you. It is similar to a spelling checker. If an error is present, you can choose to let the Link program correct it for you with its dictionary of acceptable requests. Unfortunately, the errors the program corrects are not saved to the template on disk; you must correct them manually later and save the changes.

When the template is in good form, Link dials your access number, logs on to DJN/R, and automatically fetches all the information you requested with the codes in the template. Then it logs off and asks if you want to save the data. It saves the data under a name formed from the name of the template and the word *data* as a suffix. In our example, the data is automatically saved as a SYLK file called Stock Portfoliodata.

When you return to the Link menu, click on Multiplan and open the Stock Portfolio template. Now choose Open from the File menu and choose Stock Portfoliodata. The values retrieved from the service are put into the template, and the formulas are automatically calculated to give you results similar to those shown in figure 4.

You can use the Link template whenever you want the current prices of these stocks from Dow Jones. Also available is a wealth of other information to help you make sophisticated investment decisions. You can even get information on insider trading on the stocks you are tracking.

Linking with Chart

Professional traders use charts to help make investment decisions. The visual display of information a chart provides makes it easy to spot trends. You can use Link and Microsoft Chart to design your own charts so that you can track a wide range of values available from Dow Jones that are important for your analyses. Try the sample template in figure 5.

Here, Link is receiving instructions to get the Friday closings of General Motors stock for 1984. It takes ten minutes or so to type in the 52 dates, but once it's completed, you can use this template for any set of stocks.

The syntax for the historical quote of the closing price is V−CLOSE−MM/DD/YY. Don't forget to take advantage of the Fill Right command to help you duplicate the basic structure in the 52 cells. If you fill the top row of 52 cells, starting in column 2 with V−CLOSE−01/06/84, you will have to alter only four numbers for each cell. Don't forget to save the template as a SYLK file.

Follow these steps to create your chart:

- Open Link and choose your 1984 closing-price template. In about six minutes, the Friday closing prices for General Motors are pulled into your Mac.
- Choose Multiplan from the Dow

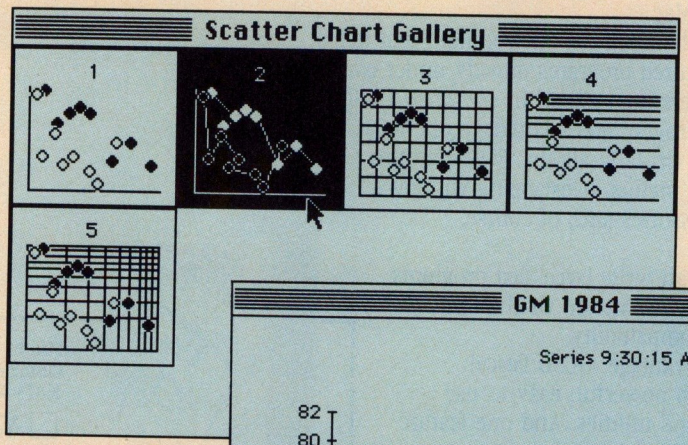

Figure 6: After you paste the Friday closing prices into the data list, choose the number 2 scatter chart.

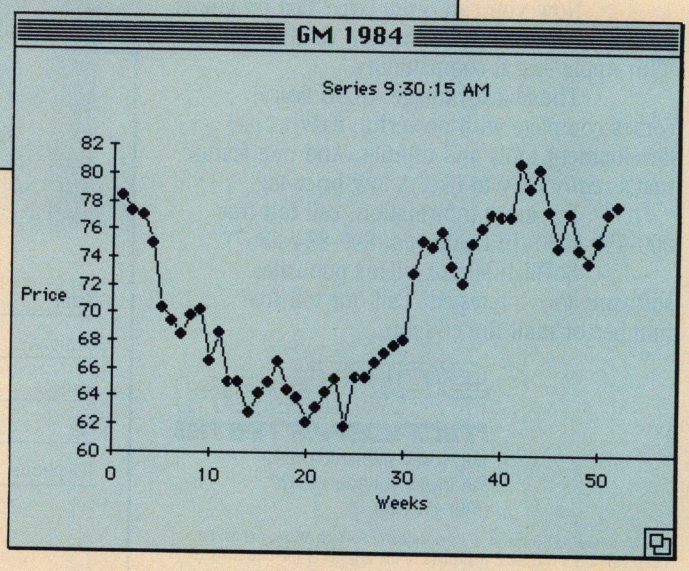

Figure 7: When you have completed the various steps for creating your chart, it should look similar to the GM 1984 chart (right).

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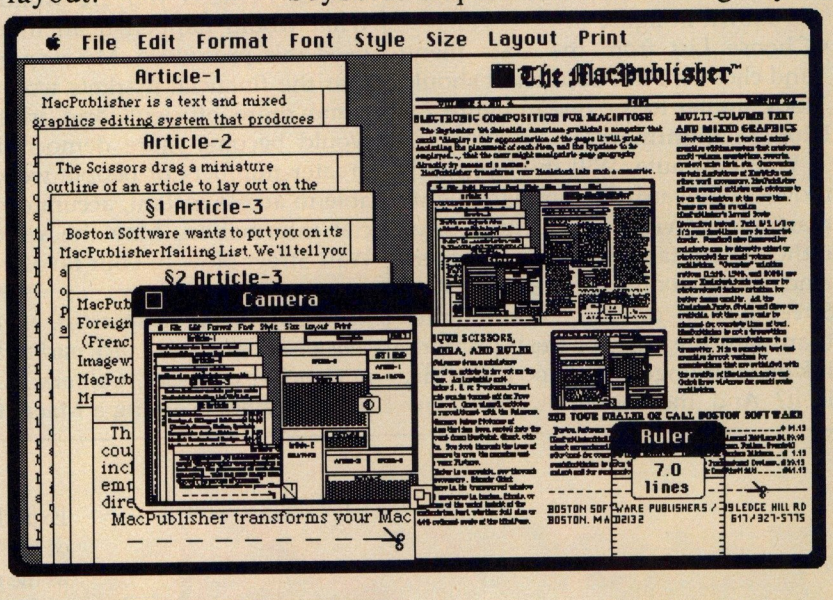

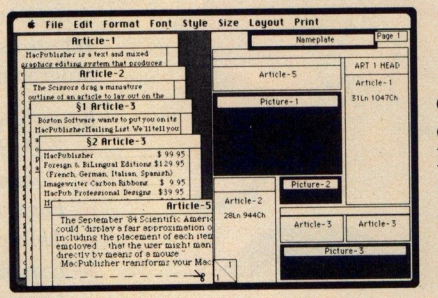

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Jones menu and open your GM 1984 template.

- Open the GM 1984 data file to insert the values you retrieved from the service into the GM 1984 template.
- Choose the 52 values by clicking on row 4, column 2, and then shift-clicking on row 4, column 53.
- Choose Copy from the Edit menu to copy these values into the clipboard.
- Quit Multiplan and open Microsoft Chart without resetting the Macintosh.
- Choose Paste from Chart's Edit menu to paste the Friday closing prices into the data list.
- Choose the number 2 scatter chart, as shown in figure 6.
- Choose List from the Data menu and click on Plot. Your chart should look similar to the one in figure 7.

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Vahé Guzelimian is an artist, educator, consultant, and free-lance author based in Cardiff-by-the-Sea, California. He is the author of Becoming a MacArtist.

PRODUCT INFORMATION

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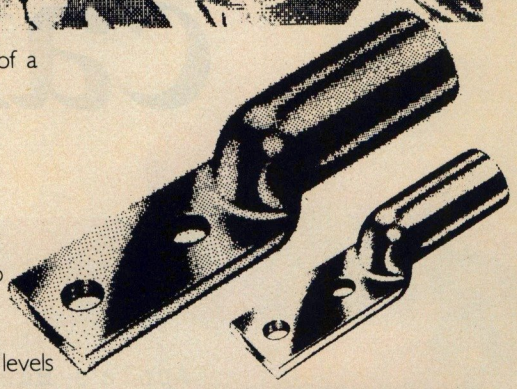

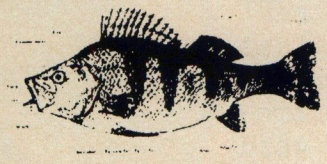

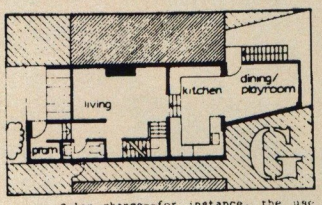

Color change--for instance, the use of a single hue in an achromatic

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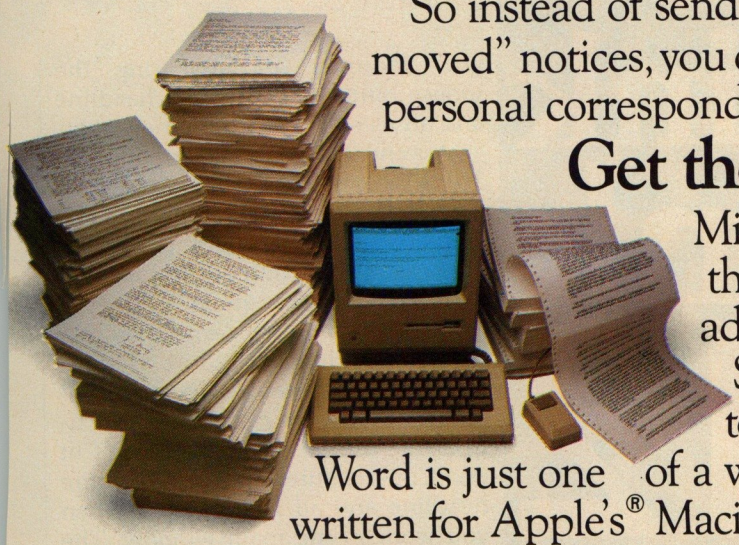

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CIRCLE 320 ON READER SERVICE CARD

SOFTWARE

BY SHARON ZARDETTO AKER

An organizational tool with countless possible applications

Think Tank 512

ThinkTank 512 is an outlining program that combines graphics, word-processing, and database elements. Using a series of headlines with many levels of subheads, you can organize your thoughts in a logical hierarchy, which you are then free to rearrange. It is a big improvement over its predecessor, ThinkTank 128.

ThinkTank 512 is advertised as an executive organizational tool, but it can be much more than that. You can put anything you need to organize and reorganize—a speech, a paper, a book, or a week's activities—into ThinkTank 512.

Working with Headlines

When you type a ThinkTank headline onto the screen, the program shows its "level"—subordination under another headline—by how far it is indented. A plus or minus sign precedes each headline, the former indicating that subheads are present, and the latter that the headline stands alone (see figure 1). You can turn a line of text into a subhead under a headline by moving it to the right. Command-R and Command-L give you movement to the right or left, respectively, and you have the alternative of dragging lines on the screen to the level of indentation you want.

So far, ThinkTank sounds like a word processor, but its first special touch is its "collapsible" and "expandable" headlines.

When you double-click on a headline, all its subheads disappear. With your outline's subheads collapsed, you can view the headlines alone—glance through the important points of a speech, for instance, without having to scroll through all the details as well. Double-clicking on a collapsed headline expands it, restoring its subheads. You can control headline collapse and expansion with a variety of mouse moves, keyboard controls, and menu selections.

Repositioning headlines within a document is simple, and, again, you have a choice of keyboard, mouse, or menu control. Holding the mouse button down puts a gray box around the selected headline and changes the cursor to an arrow (see figure 2). The selected headline remains stationary as you move the arrow to point to the new location, and releasing the mouse button switches the headline and all its subheads to the new spot.

Another organizing option in ThinkTank is its Sort feature, which alphabetically sorts the subheads of any headline you select. (Choosing the main, or "summit," headline sorts the entire document.)

Standard editing techniques are not available in the headline window, but you don't need to do much besides backspace to correct the brief titles you use as headlines. The Cut and Copy features apply to an entire headline and all its subheads when you work in the main window. The program has a Search feature with a Replace option that can help in large editing chores.

A document comprising only headlines can be helpful, but it is limiting. ThinkTank 512, unlike the 128K version, lets you open a window for any headline and enter text as you would with a word processor (see figure 3). You can also use a window for graphics.

The ThinkTank interface has been the object of some criticism because it is not the Macintosh standard. The ThinkTank main window has no title bar and no scroll controls—it is nothing, in fact, but a white rectangle sur-

GREG SPALENKA

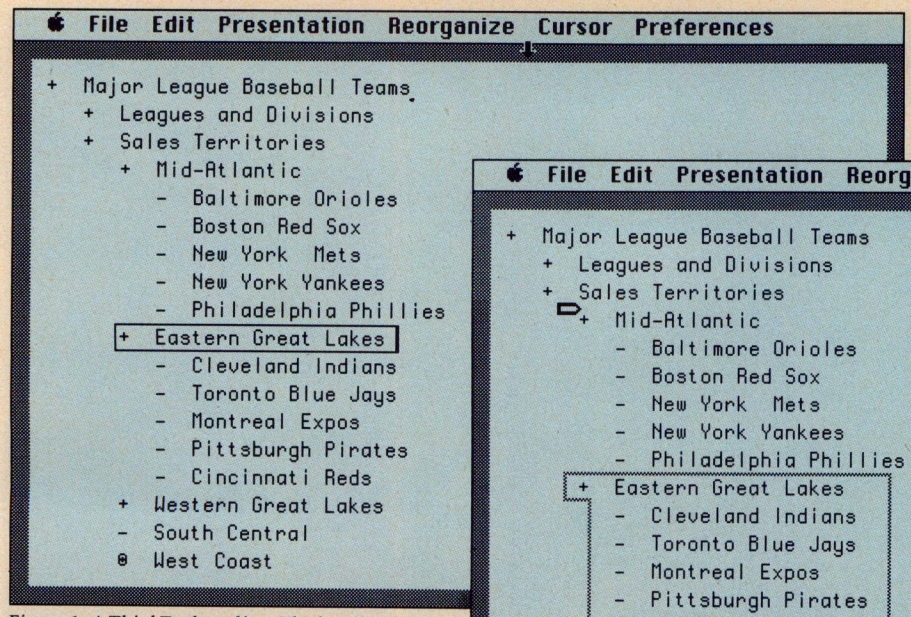

Figure 1: A ThinkTank outline: The headline Leagues and Divisions is collapsed; Sales Territories has been expanded, with two of its subheads also expanded. The headline Eastern Great Lakes is currently selected for editing. The plus and minus leader characters indicate whether or not a headline has subheads; a circle around the leader character, such as the one in front of West Coast, means a window is attached to the headline. The cursor in the gray scroll area becomes an arrow that indicates the direction in which the arrow will scroll.

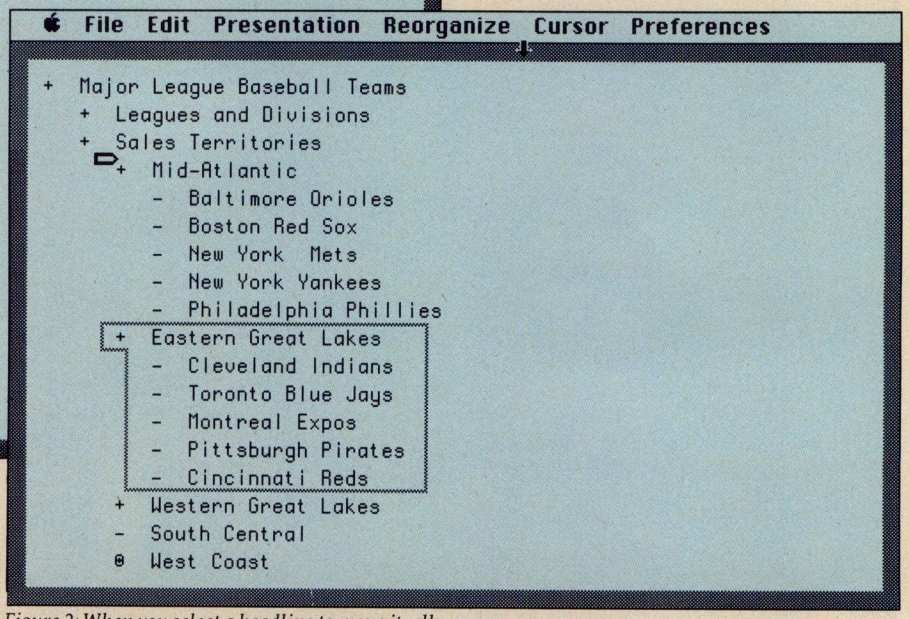

Figure 2: When you select a headline to move it, all its subheads are automatically selected as well. The mouse cursor changes to a block arrow. Here, the Eastern Great Lakes headline and its associated subheads are going to be shifted above Mid-Atlantic.

rounded by a gray border.

To scroll the ThinkTank window, you work in the gray edges. Clicking in the gray area above or below the window scrolls the text vertically, using the side areas scrolls the document horizontally, and clicking in the corner scrolls it diagonally. Diagonal scrolling is almost a necessity in ThinkTank, in which continually indented subheads go off the right side of the screen in no time.

The ThinkTank window is definitely nonstandard, but—I know this is Macintosh heresy—it is more intuitive than the normal procedure. I do miss the scroll box that lets me know what portion of the document I am working in, though. Also missing is the ability to go directly to a portion of your document by dragging the scroll box.

Text Windows

Double-clicking on any headline expands or collapses it, and clicking on its initial character opens a window for that headline. You can also use a keyboard sequence to open a window, and you can choose or change to a small window or a screen-sized one at any time.

The editing capabilities in a text window are not those of a full-featured word processor, but they are more generous than those you have available for editing headlines, and they are adequate. A variety of cursor controls lets you move around in the text. Using the ⌘ key and numbers, you can move by line or by page, or to the beginning or end of the text.

Graphics Windows

The window you open for any headline can contain graphics (see figure 4), and ThinkTank has an interesting system for importing graphics.

First, you must prepare a scrapbook of the graphics you want to incorporate. If you have the scrapbook on the ThinkTank disk, all you need to do is choose Paste Scrapbook from the Edit menu, and the program pastes the entire scrapbook into your document. The scrapbook pages—named PICT 1, PICT 2, and so on—appear as headlines, and you can move any of them to any part of your outline. Opening a window on the headline lets you view the graphic.

You can resize the graphics window by using a size box in the lower right corner; the size of the picture itself is unaffected, but the portion that you view changes.

In addition to being able to paste in graphics such as charts, floor plans, and graphs, you can use ThinkTank's special Slide Show feature to arrange an on-Mac demonstration.

The Slide Show flashes designated windows on the screen, one after another. You can preset the delay time in 60ths of a second or have the screen change when you click the mouse button. The headline that titles the "slide" can appear or not, as you choose, and you can select the Repeat option, which makes the show begin again after all the slides have been shown.

The Slide Show option works smoothly, but it pales in comparison to a dedicated graphics-presentation program such as the Slide Show Magician, so the best I can say about it is that it is nice.

Printing

Although I liked ThinkTank 128, its printing options disappointed me; ThinkTank 512, on the other hand, provides most of the options I want and a few I hadn't considered.

With ThinkTank 512, you can print an entire document or selected portions, and you can apply many options to the portion of the document

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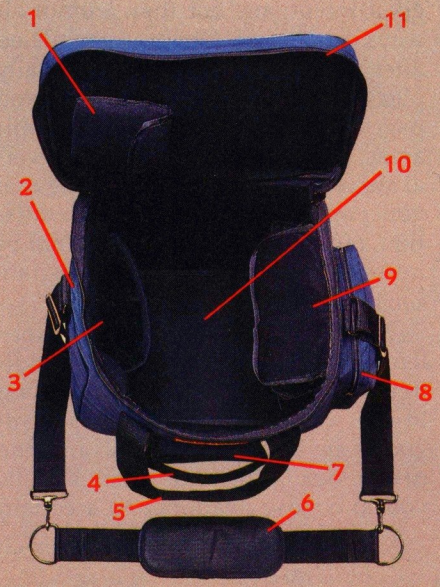

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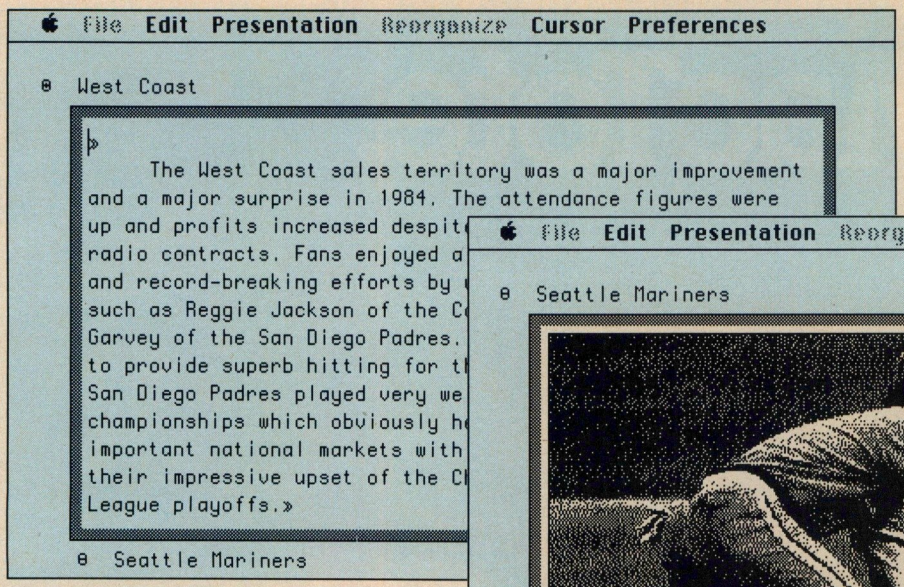

Figure 3: You can open a text window for any headline, but you can scroll and resize it only vertically.

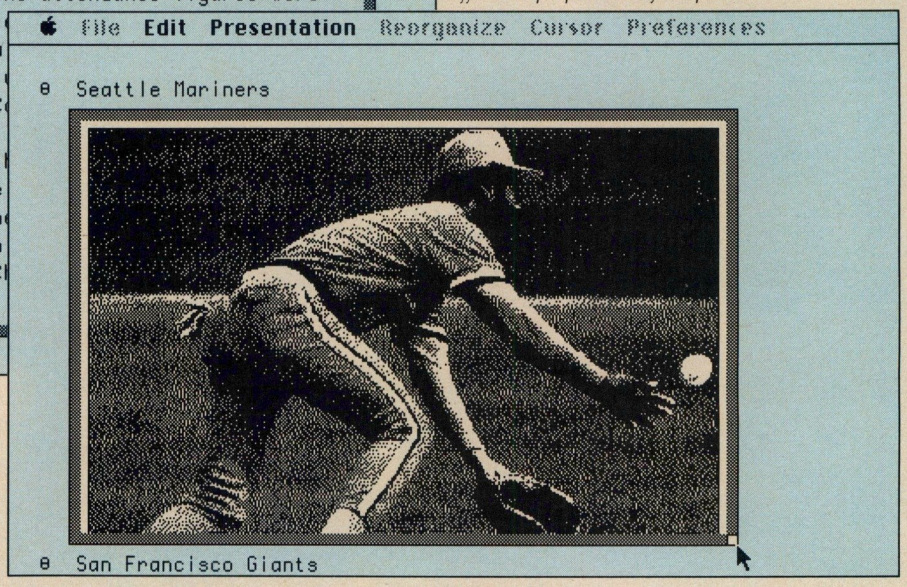

Figure 4: You can paste any scrapbook page into a graphics window; resizing the window does not affect the proportions of the picture.

you choose to print.

First, you can decide how many levels of your outline to print—only the main ones, main plus one subhead level, and so on. You can also specify how many levels will print in boldface. You can separately define the level to which your windows should print. So, you can have many combinations: headlines only, windows only, headlines and windows to the third level, and so forth.

If you choose to include a header or footer, it will consist of the date, the main headline, and the page number. Also available are a choice of single-, double-, or triple-spacing; numbering of headlines; the standard Mac print-quality options; and a separate table of contents.

The Word-Processing Link

You can move items from ThinkTank to MacWrite or Word by copying them onto the clipboard, and, although this technique is not covered in the documentation, you can use the clipboard to move things *into* ThinkTank as well as open ThinkTank outlines directly from within either of the word processors.

Copying an outline (or a portion of the outline) onto the clipboard and then pasting it into a word-processing program leaves you with a list of headlines preceded by plus and minus signs, but they are all aligned at the left, with no indentations for the various levels. Opening a ThinkTank outline directly from within a word-processing program leaves you with left-aligned headlines that are preceded by such comments as .HEAD 1 + or .HEAD 4 −. Again, the levels have no indentations.

Either way, you must do a lot of searching and replacing to get rid of the leader characters. At least you can kill two birds with one stone and insert spaces, arrows, bullets, or whatever, to format each headline the way you want it, as you remove the unwanted characters.

Working in reverse, you can use the clipboard to move a list of words or phrases into ThinkTank; if the elements are separated by carriage returns, the first one will be treated as a major headline and the rest as its subheads.

Documentation

ThinkTank's documentation has good intentions, but they are not always carried out. Obviously modeled after Apple's manuals, it is visually pleasing, with brief sentences and pages divided vertically into topic areas. It falls short, however, in several areas. It isn't missing anything that you won't learn from experimentation, but experimenting should not be necessary with a quality program such as this.

Many of the documentation problems involve inconsistent terminology. What has been *windows* all along in the text suddenly becomes *paragraphs* in both the manual and the dialog box. When the manual tells you to choose headlines to a certain level, it leaves you wondering if the summit headline counts as a level or not. It notes that you can have the headlines numbered, but it does not describe the numbering system.

You won't find any mention in the manual of how to use ThinkTank with another program—either putting ThinkTank files into a word processor or reversing the process.

Backups and Upgrades

ThinkTank 512's copy protection is one of the standard Macintosh protection methods: If you use a copy of the master disk, the computer will still ask you to insert the master when you start the program. This approach limits your ability to use a hard-disk drive fully to organize your software library. You can get a second master disk if you send the registration card to Living Videotext—the master backup is free.

If you have upgraded your Mac to 512K and also want to upgrade your ThinkTank 128, you can send your 128 disk and $100 to Living Videotext, and the company will send the new version.

If you are not upgrading your Mac, you may be curious about how ThinkTank 128 compares to its successor. The 128 version lacks text and graphics windows, and it has fewer optional keyboard commands. It offers no printing options—any head-

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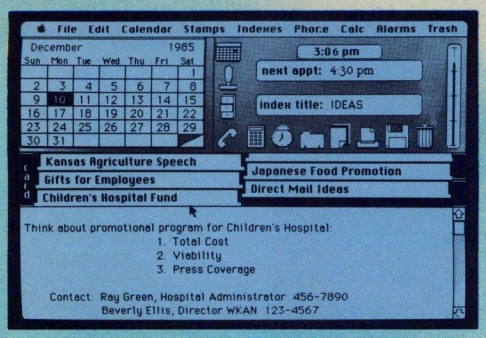

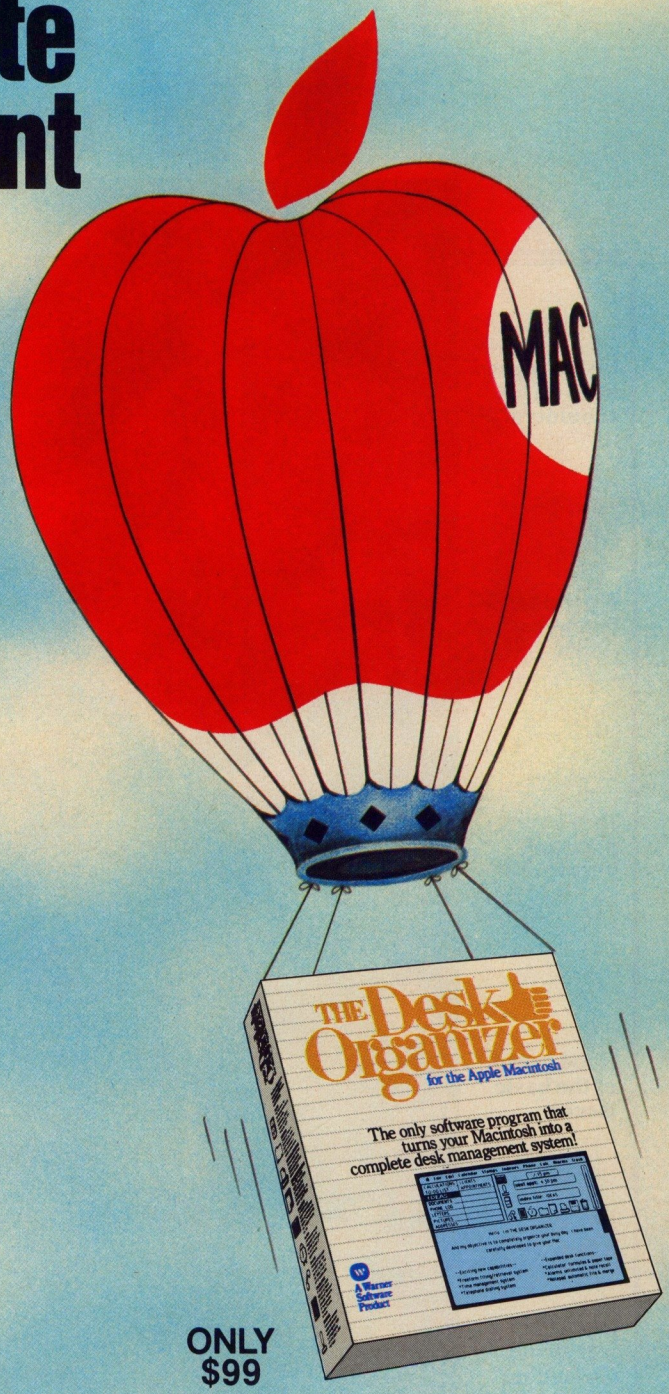

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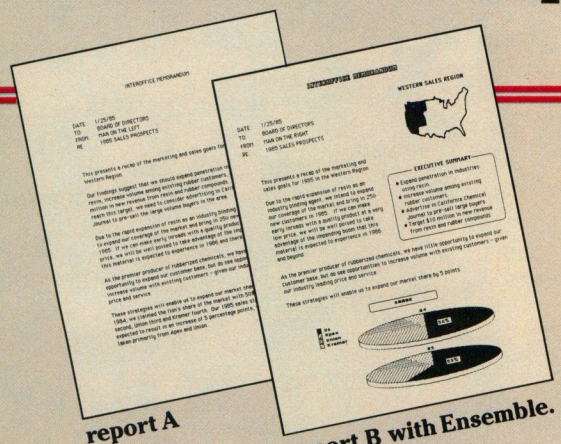

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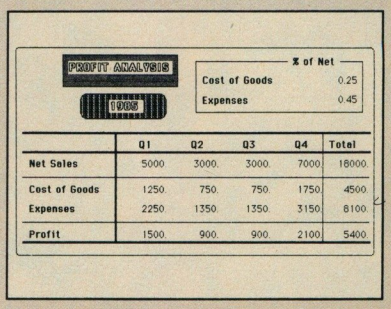

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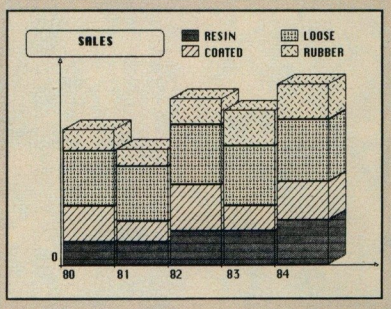

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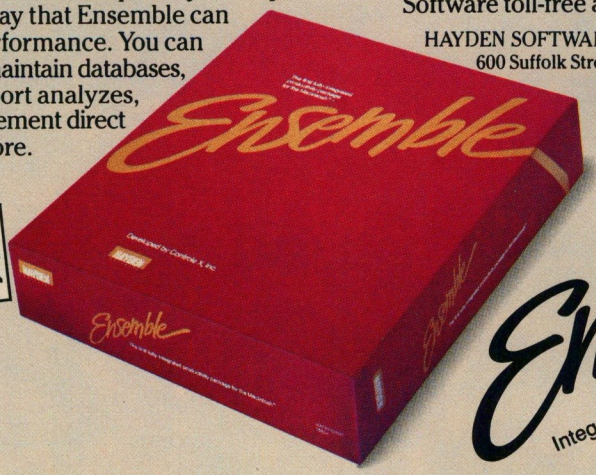

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CIRCLE 297 ON READER SERVICE CARD

A Day in the Life of a ThinkTanker

Thinking of ThinkTank as just an outliner can inhibit your use of the program. You'll be surprised at what you can do with "just" an outliner, with a little imagination. Although I didn't do all of these things in one day, I did every one of them recently—and I've hardly made use yet of ThinkTank 512's windows, so you could do all this with the 128 version, too. Read through this list, and then imagine what you might be able to do with ThinkTank.

- Outline a book: A book proposal takes a lot of work, and the foundation is the book outline. Making revisions is an easy matter, both during the initial proposal stage and later as you write the book.
- Outline a seminar: I've actually outlined two seminars, one to introduce noncomputerists to the Mac and another for new Mac owners. It was like outlining a speech, with notes to myself along the way about what programs I would demonstrate, whom I still needed to contact about the demo machines, and so on. If I were a teacher, I would find lesson plans easier to arrange with ThinkTank than in my plan book.
- Outline an article. This type of project—similar to outlining a book, but on a smaller scale—is familiar to me. If I were in school—on the student end of things—I'd organize term papers this way; in business, reports would benefit from a finely tuned outline.
- Arrange a database: Confronted with a database-management program that didn't take kindly to the addition or renaming of fields, and some complicated data that had to be pulled into some sort of order, I used ThinkTank to set up the field categories and renamed and rearranged them. Then I used the database program, knowing I had the right setup to start with.
- Alphabetize a list of words: My Word document had a list of more than 100 BASIC reserved words listed in order of appearance in a book; I needed them listed in alphabetical order. It was simple to use the clipboard to move the list to ThinkTank, sort the words, and open the sorted outline when I was back in Word.
- Index a book: Indexing the page proofs of a book is normally no easy task, but with ThinkTank it was a breeze. As I read through the book, I typed in each word I wanted to appear in the index, followed by its page number. Subcategories (such as "Arrays, numeric") were easy to arrange as subheads. An overall alphabetical sort arranged the items and made duplicates easy to find and fix ("pixels, 18" and "pixels, 37" became "pixels, 18,37"). Selecting categories such as Arrays and choosing the Sort option again arranged all the subcategories alphabetically.

One of ThinkTank's most useful applications, setting up and maintaining a calendar, is perhaps its least obvious one, and it is so versatile I'm not sure what to call it.

I begin with main headings of Days and Categories; under the first come the days of the week, and under the second come the divisions of Work, Home, and Misc.

Work is easy to divide into the subcategories of my computer-related work: Books, Magazine Articles, Seminars. Each has its own subdivisions, such as a list of the magazines I write for, further broken down into current article assignments, and so on. The Home category is a to-do list of odds and ends—my son's gymnastics classes, a doctor's appointment, a note to call the cable company. Misc. is just that—social engagements, users' group meetings, and so on.

I break each category down into its detailed components and open windows where necessary for a lot of text, usually in the Work category when I think of some information I want to put in an article.

When I have typed in all my current commitments and goals, I choose headlines from the Category half of the outline and copy them. Then I paste them into the first half of my outline, under the appropriate day. By the time I'm finished, I have Work, Home, and Misc. categories under every day of the week.

Such an outline takes less time to set up than you would expect, and it is a cinch to update. If I don't get all my Monday things done, I drag them down to Tuesday; when I've attended to an item, on the other hand, I can cut it out of the outline.

I printed out this outline once—I knew I was a busy person, but I never knew just *how* busy until I saw everything in print.

If you're a busy person, you can make use of ThinkTank, too.

line you choose will have all its subheads printed, to all levels, in standard-quality print. The 128 version is still a versatile program, however. All the activities I describe in "A Day in the Life of a ThinkTanker," which accompanies this article, are possible with the 128 edition.

What's Missing?

ThinkTank 512 is wonderful, but it's not perfect. Of the few minor problems in this first release, only one will cause you concern: You cannot print double-spaced text. Choosing double-space gets you triple-spaced printouts, and choosing triple-space results in quadruple-spaced text.

ThinkTank 512 has more run-time on my Mac than any other application except Microsoft Word—as a writer, I can't use anything more often than a word processor. ThinkTank 512 runs a close second, though, and I give it heavy use as a basic outliner and an all-round organizer.

This program deserves rave reviews. It is useful, versatile, and deceptively easy to use. In addition to the ingenuity of the overall concept and its excellence in practice, one of its finer points also deserves praise: You can avail yourself of almost every feature in three different ways—by mouse, keyboard command, or menu selection.

Being a RAM-resident program, ThinkTank 512 is extremely fast, and the amount of available memory does not limit it, as it did the 128K version. Along with providing extra features, 512 lets you have up to 3200 headlines in your document, an outline as large as 270K, and text windows that can each contain up to 32K.

ThinkTank 512 may push me to my limit of computing power, but I don't think I'll be able to return the compliment. ✚

Sharon Aker is a free-lance journalist specializing in Macintosh applications. Her books include the recent MacPack *from Ashton-Tate and the forthcoming* Microsoft BASIC on the Mac *from Scott, Foresman.*

PRODUCT INFORMATION

ThinkTank 512
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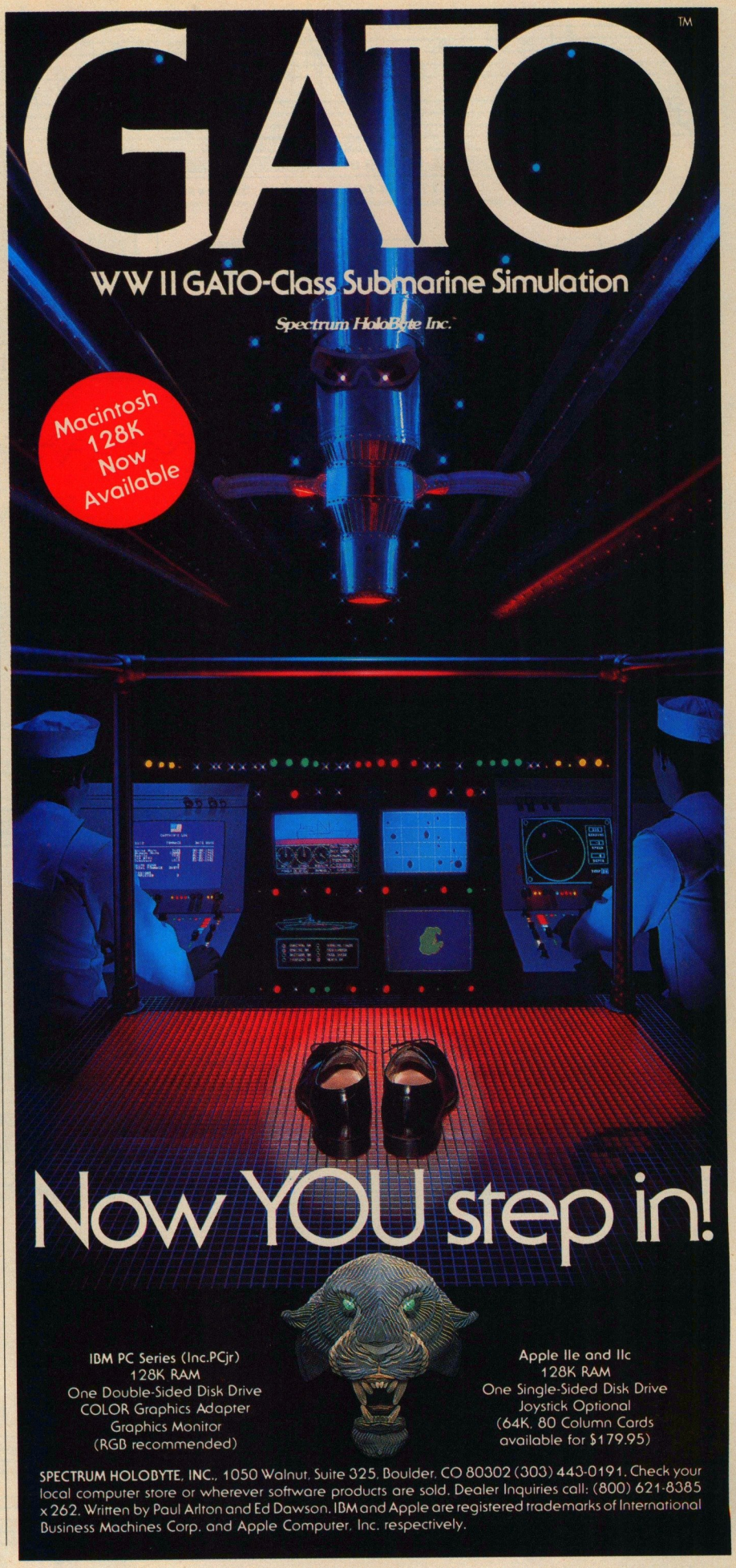

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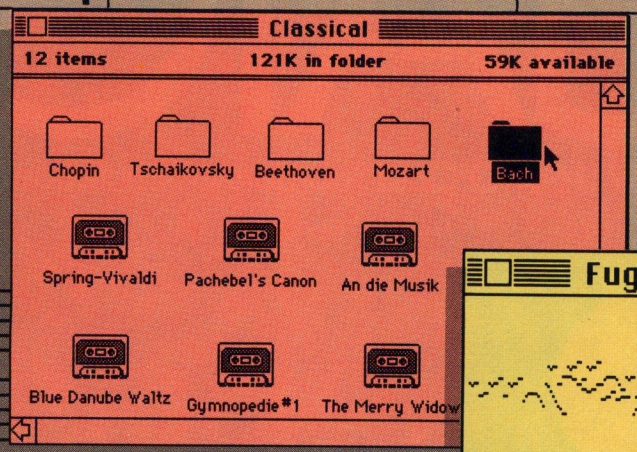
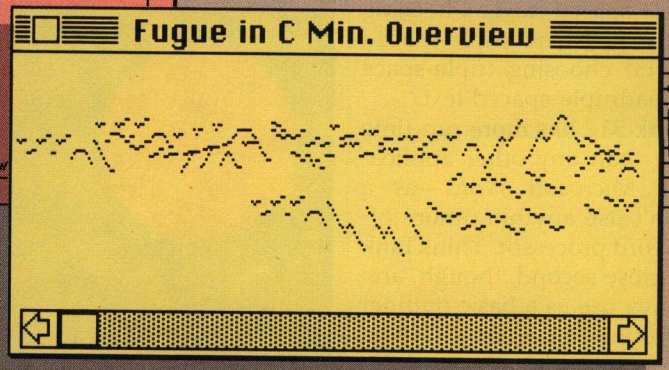
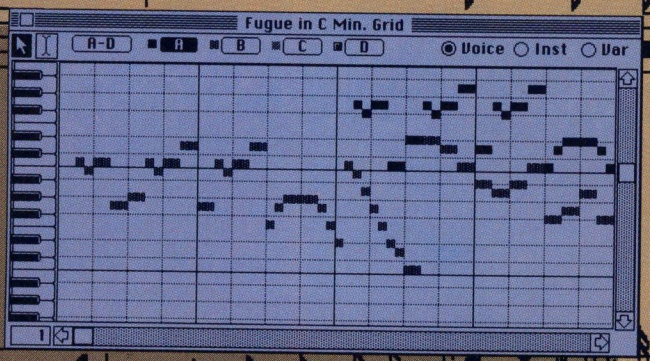




"Fugue in C Minor," one of MusicWork's many prerecorded melodies, has been selected from the Bach folder (above). As the music plays, you can view the music through three windows: a conventional staff, an overview (right), or a special grid (below).

Music



SOFTWARE/*BY GREG STONE*

It was love at first sound with Hayden Software's

Works

When I walked into my local computer store and found MusicWorks running on a Mac, it was love at first sound. Out came my wallet, and I went home $80 poorer, but rich in the spirit of excitement that had brought me to the Mac in the first place.

Here was a simple program for composing, arranging, and transcribing music and listening to the results. It was hardly the kind of full-blown music system covered in "Opening Musical Vistas," in the November 1984 *A+* (pages 50–59), but then, it didn't carry the price tag of one of those systems.

The program gives you

- More than 40 musical selections to listen to or modify
- Three methods to see your music—an overview window, a conventional staff, and a special grid
- Four voices, a composing range of eight octaves, eight different instruments, and 12 ways to play them
- Sheet music printouts of individual voices or entire scores
- The ability to play an entire song, repeat a song or specific sections, and listen while you compose or edit

An ability to read sheet music is certainly helpful in using the program, but hardly necessary. Anyone can simply copy music into the program from a published score and then play it, making simple modifications, such as having one instrument play all four voices or using different instruments for different sections and voices. (The program has a keyboard-like grid system for composition without conventional notation.)

Keying Up

To copy a song from a book or sheet music, you open the MusicWorks icon and select Staff from the Windows menu (see facing page). You are presented with standard treble and bass staffs, all blank, of course. Choose Meter from the Windows menu and set the time to match the piece you're copying. Similarly, choose Key Signature from the Windows menu and set the key. (If you don't know the keys by their letter designations, just experiment until the sharps or flats at the start of the staff on the screen match the sharps and flats at the start of the piece you're copying.) Click on the A but-

GRAPHICS COURTESY OF HAYDEN SOFTWARE

ton to indicate you are about to put in a note for the first voice.

From there, MusicWorks is like a musical version of MacPaint. You point to a note you desire, click on it, move the pointer to the correct location on the staff, and click again. You can erase or reposition the note. You place appropriate rests, sharps, flats, or naturals on the staff in a similar manner. If, at any point, you want to hear what you have put on the staff, just click on the Play button on the control panel.

I had great fun with these steps alone and gained a larger appreciation for music in the process. Two reasons for this increased appreciation were the ability to hear what I'd just "written," and the ability to hear any one or more of the four voices I'd selected. I found myself listening first to the melody and then going back and listening to one or more of the other voices. (You can select the third voice, for example, and also highlight that voice alone on the musical staff.) Finally, I put it all together and really heard the piece for the first time, for my ears were now much more sensitive to all that was happening musically, rather than being focused on one portion of the music.

Changing instruments for portions of music is also enjoyable. The differences here are sometimes subtle, but you can create the changes so quickly that comparing instruments is simple. The program comes with eight instruments, but you can create your own unusual sounds with the two synthesizers provided, simply by drawing wave forms.

Two other windows provide visual representations of the music. One is an Overview window, which looks like a flattened drum of a music box (see page 112). The staff shows only a few measures of music at a time and must be manually scrolled, which you can do while the music is playing. The overview shows much more, and you can jump on the staff to any portion displayed on the overview, by pointing to that portion and double-clicking. Using the two views in this way is useful for following the general course of the music, and then checking on a specific section.

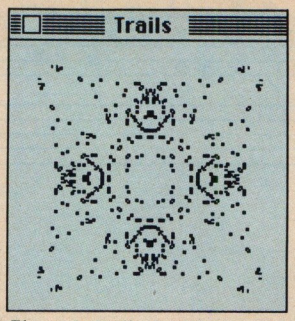


Figure 2: Trails doodling screen

Finally, you can also use the third window, the "grid," for writing music (see page 112). In fact, anything you write on the staff also appears on the grid, and vice versa. The grid resembles a keyboard and provides another way to represent the length and pitch of notes.

MusicWorks also gives you

- editing features that include Cut, Copy, and Paste
- the ability to alter the tempo and volume of your music
- the chance to hook the Mac to a hi-fi by way of one wire from the Mac's sound output to the hi-fi's auxiliary input
- the option of transposing any music you copy into MusicWorks merely by selecting a new key from the key signature's dialog box
- the ability to apply any of 12 variations to the way a note or group of notes is played
- the ability to move any note or any group of notes up or down in half steps or complete octaves by simply selecting a menu item or by typing a command-key sequence
- the option of flipping a selected group of notes on its vertical or horizontal axis

You can see that MusicWorks is plenty of program for the money. The program is smart—it won't let you put too many notes in a measure, for example—and it takes full advantage of the Mac's user interface. The programmers have a sense of humor—be sure to check out the volume-control box on the control panel (see figure 1)—and they have provided some pleasant surprises. A little doodling screen called Trails, for instance, is a new desk accessory that's great to play with while you listen to the music (see figure 2).

Don't expect miracles, though. A few aspects of MusicWorks could be better. It would be nice, for example, to hear an individual note as it was placed on the staff. It also would be handy if you could change the time signature within a piece. (It's set once, at the beginning, and any changes apply to the entire piece.) Finally, the program has a length limit that makes it fine for the average song but limits longer work. In 4/4 time, the limit is 64 measures. From a playback standpoint, I would appreciate a way to chain selections together to simulate a long-playing record performing several selections in sequence.

Of course, serious musicians would want more—musical keyboard input, eight voices, and a greater range, for instance—and these features will undoubtedly show up eventually, but with a higher price tag. If your interests are more casual, though, you'll find MusicWorks well worth the investment. ✚

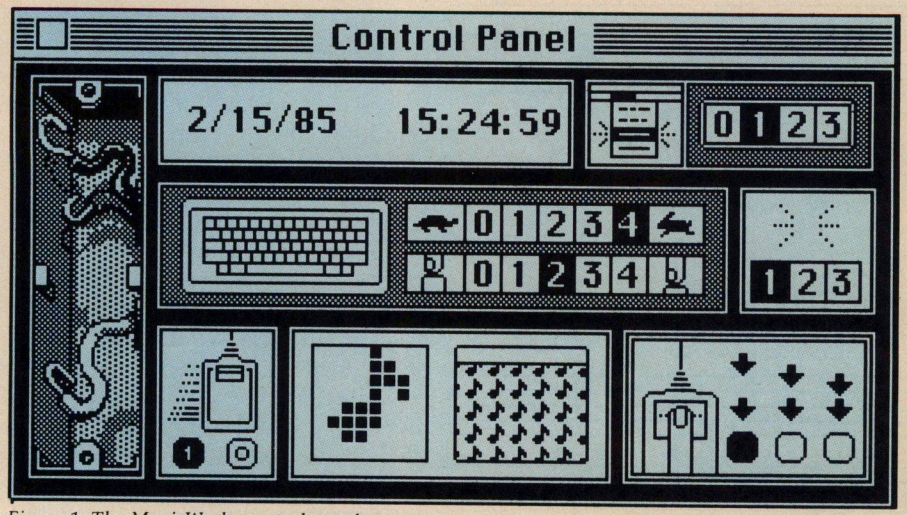


Figure 1: The MusicWorks control panel

Greg Stone is a free-lance writer and director of community relations at Southeastern Massachusetts University. He has contributed to numerous science and computer magazines.

PRODUCT INFORMATION

MusicWorks
Hayden Software Company
600 Suffolk Street
Lowell, MA 01854
(617) 937-0200
List Price: $79.95
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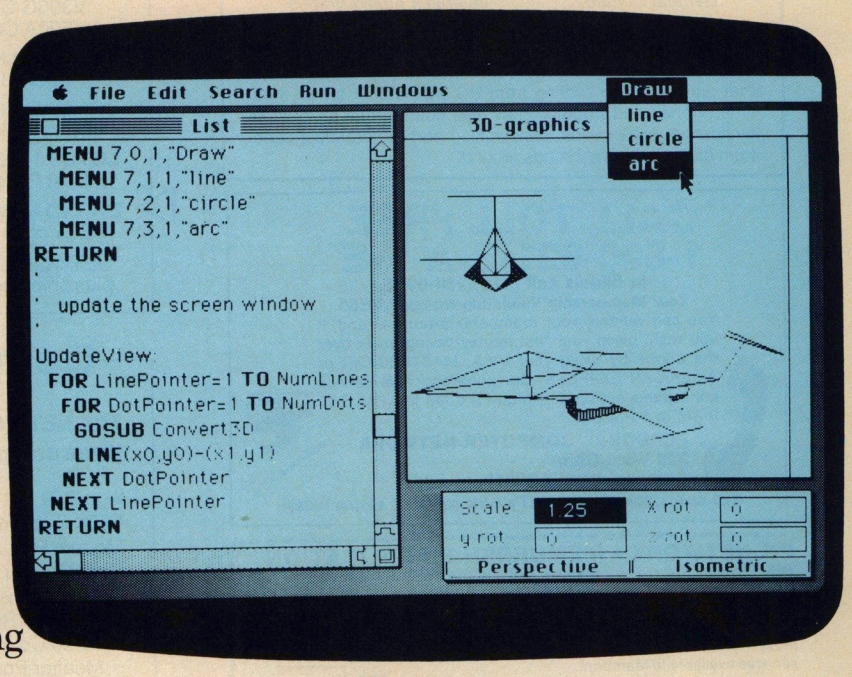

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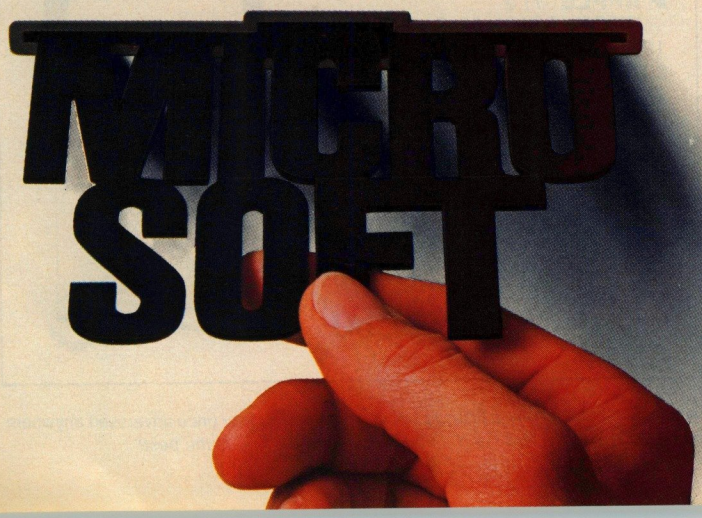

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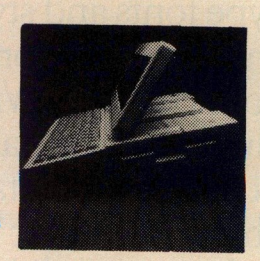

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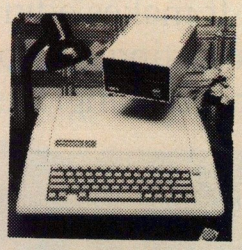

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Apple's Macintosh Office strategy has major implications for the publishing industry.

Desktop Publishing

The publishing industry may never be the same. Apple's Macintosh Office strategy provides elegant new hardware and software solutions for various important publishing tasks at an unprecedented low cost. The Macintosh Office strategy is inexpensive enough for small self-publishers, yet powerful enough to meet many needs of large printing and publishing companies. This approach to publishing definitely warrants consideration by any business that is involved with the creation of printed materials.

The Macintosh computer is the star of the Macintosh Office, but many other microcomputers can play supporting roles, including the rest of Apple's computers and the IBM Personal Computer series. Other key players in the scenario include the low-cost AppleTalk Personal Network, which interconnects up to 32 computers and peripherals, fileservers that allow the sharing of mass-storage devices, the advanced LaserWriter laser printer, the POSTSCRIPT graphics language, and Allied/Mergenthaler's POSTSCRIPT-compatible versions of the Linotron 101 and Linotronic 300 typesetting machines (for further details refer to "The Macintosh Office" and "The AppleTalk Personal Network Technical

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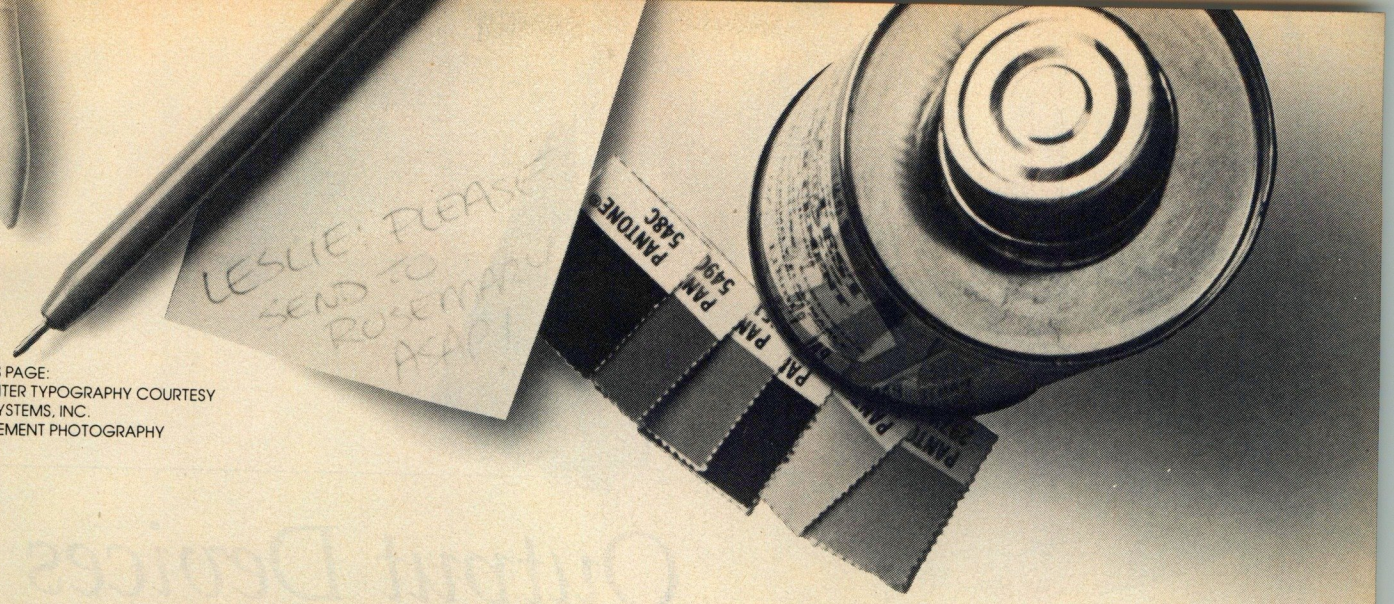

PREVIOUS PAGE:
LASERWRITER TYPOGRAPHY COURTESY
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Specifications," pages 26–37 in the March 1985 issue of *A+*).

Although the Macintosh Office strategy was designed for a broad range of business uses, the software and hardware for some applications still need further development. In the area of publishing, however, Apple has made some significant strides that promise to change the publishing industry by providing low-cost, yet high-quality, page-layout and typesetting systems for personal computers. This new development is so significant that it has already been dubbed "desktop publishing," a designation that we feel is especially appropriate since it represents a major milestone in desktop computing. The name is also a play on words that alludes to the desktop analogy that describes the Macintosh's operating system.

Up to now, most electronic page-layout and typesetting systems have been built around expensive minicomputers. The cost of these electronic publishing systems ranges from around $50,000 for a single workstation with a laser printer to $500,000 and up for a larger system with several workstations, a laser printer, and a typesetting machine. The Macintosh Office technology offers the first full-blown electronic publishing system for personal computers at a fraction of the expense of previously available systems. A Macintosh Office system for electronic publishing costs less than $10,000 for a single workstation and a laser printer and $30,000–$50,000 for a larger system with several workstations, a laser printer, and a typesetting machine.

The availability of Allied/Mergenthaler's Linotron 101S and Linotronic 300 typesetting machines means that the quality of the typeset output can be top-notch. Allied/Mergenthaler is the most respected name in typesetting, and its endorsement of the Macintosh Office technology is to the publishing industry what IBM's entry into microcomputers was to the computer industry.

Until now, the avenues open to publishers have been fairly narrowly delimited. In a typical publishing operation, you create documents on a typewriter or word processor. Someone then enters this draft copy into a typesetting machine, which produces a galley proof. Next, the galley is proofread, and any necessary corrections are made. The corrected galleys are pasted up by hand, together with any illustrations or graphics, during the page-layout process. The final layouts are known as camera-ready copy, because the last step is to photograph them to create the plates for the actual printing process.

Because the procedure we've just described is both time-consuming and costly, many shortcuts have been devised, but these methods usually produce fairly crude results. The simplest small-scale publishing involves creating text on a typewriter, pasting it up—with any illustrations—by hand, and reproducing the results with a photocopy machine. Many small newsletters and catalogs are created in this manner, although it is quite tedious and the results can be of fairly poor quality.

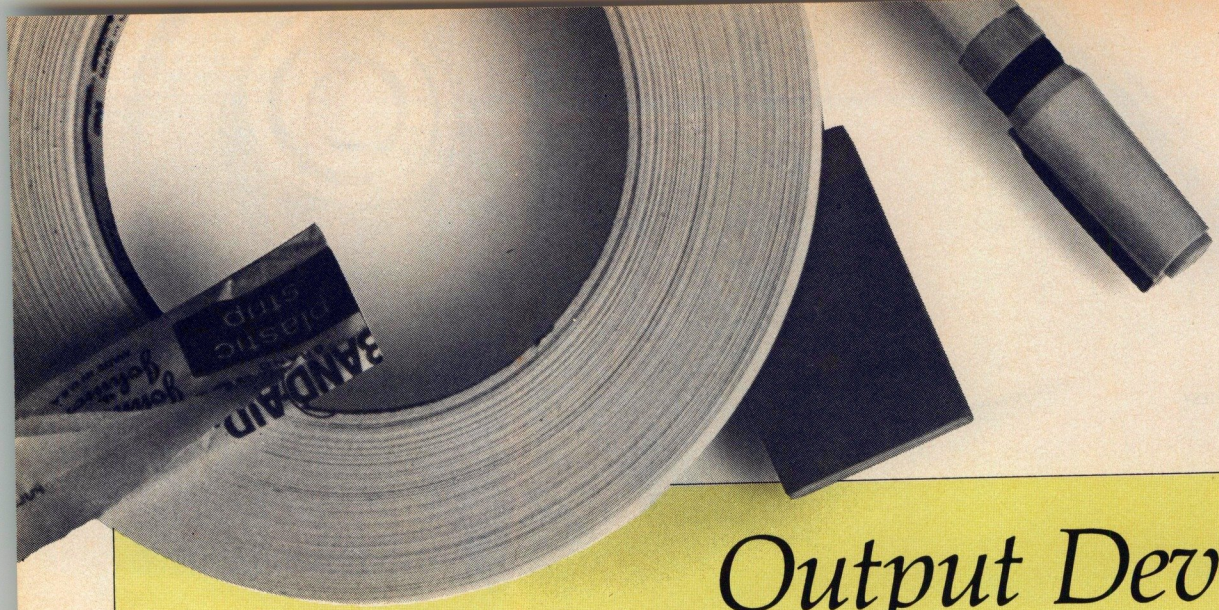
The next step up is to use a computer and a printer, which produces documents that don't look much better than those created with a typewriter, except for the ability to produce right- and left-justified margins. You can achieve more professional quality by transmitting documents electronically to a typesetting house or sending your disks to it.

A major fiscal drawback of such an arrangement is that unless the files are error-free, every change, affectionately known as an *ae*, for author error, can be expensive to correct, since you have to have the documents retypeset, at a typical cost of $10 to $20 per page. Furthermore, you have to adjust to the typesetters' schedule. This process makes small-scale publishing a difficult enterprise that usually results in a compromise in quality.

The Macintosh Office's desktop publishing system changes all that. You can generate near-typeset-quality documents on the LaserWriter for less than five cents a page. For many small-scale publishing operations, LaserWriter output will be good enough to use as camera-ready copy. Traditional publishers, and others with a need for true typesetting, can produce typeset documents on either the Linotron 101S or the Linotronic 300 for less than $1 per page.

Apple Leads in Desktop Publishing

About a year ago, Apple planted the seeds of desktop publishing by introducing the Macintosh and the Imagewriter printer. In tandem, these



Output Devices

The Macintosh, its applications, and page-layout products constitute the input tools for desktop publishing. Once you've designed a document or a publication, you have to produce it. For output, your options range from dot-matrix printing at the low end to professional typeset quality at the high end.

IMAGEWRITER

Although the vertical resolution of this dot-matrix printer is only 72 dpi, it may suffice for some desktop-publishing applications. If its quality is not sufficient for the final product, you may want to use it for preliminary tasks.

For example, you can use the $595 Imagewriter for proofreading. You first print your document on the ImageWriter and then proofread it and make corrections before you go on to the final product. You can also use the Imagewriter for rough layouts, again before you proceed with the final product.

The final product can be output from the LaserWriter, if its quality is good enough for your needs, or high-resolution typesetting from one of the Allied/Mergenthaler typesetting machines.

In either case, and depending on your resources, you could purchase an Imagewriter and a LaserWriter or Linotronic, or you could purchase only the ImageWriter and take your finalized disks to a service bureau with a LaserWriter or Linotronic machine.

LASERWRITER

This printer is based on the Canon LBP-CX laser print engine. Apple has built a powerful computer into the printer to accommodate the PostScript language. In fact, the LaserWriter contains more computing power than the Macintosh does.

The LaserWriter has a 12-MHz 68000 microprocessor (as opposed to the 6 MHz 68000 of the Macintosh), 1.5 megabytes of RAM and half a megabyte of ROM where the resident typefaces are stored. Built-in font masters—stored as outlines of the fonts—are Times, Helvetica, and Courier, all in Roman, bold, italic, and bold italic; and a symbol font. The printer has AppleTalk and RS-232 connections.

The LaserWriter prints on paper, acetate transparencies, preprinted forms, and envelopes at four to eight pages per minute, depending on the task at hand. A replaceable cartridge that you need to change every 3000 pages contains the toner and photoconductor.

In addition to the PostScript page-descriptor language, the LaserWriter has Diablo 630 emulation, which circumvents PostScript, for printing text that looks like daisy-wheel output. This feature is compatible with the information many word processors generate.

The LaserWriter's list price of $6995 includes built-in fonts, corresponding screen fonts, software for installing the printer drivers in the Macintosh, and one cartridge.

LASERGRAFIX 1200

QMS sells a PostScript controller for the Macintosh that plugs into QMS's Lasergrafix 1200 printer. The controller costs $5000, however, and the printer itself lists for $24,095. This printer weighs nearly four times what the LaserWriter weighs (270 vs. 70 pounds), and it offers the same resolution: 300 dpi.

The Lasergrafix 1200's printing speed is rated higher than that of the LaserWriter (12 vs. 8 pages per minute), and it has a duty cycle of 15,000 pages per month, which means it can handle a heavier print load than the LaserWriter can.

QMS will also produce an even more capable PostScript-compatible laser printer later this year called the Lasergrafix 2400. The 2400, which costs about $40,000 for the printer and controller, will accept larger paper than the LaserWriter does (up to 11 by 17 inches), is rated at a speed of 24 pages per minute, and has a duty cycle of 30,000 pages per month, which is about ten times that of the LaserWriter.

LINOTRON 101S AND LINOTRONIC 300

This typesetting machine sets type in three resolutions: high (1400 × 1446 dpi), regular (1400 × 723 dpi), and proofing (1400 × 362 dpi). The list price of the Linotron 101S without PostScript is $19,950.

The Linotronic 300 sets type in three resolutions: high (2540 × 2540 dpi), regular (1270 × 1270), and proofing (1270 × 635). The list price is $38,950.

PostScript versions of both typesetting machines are slated for release in the third quarter of 1985 and will probably sport slightly higher price tags than their non-PostScript counterparts. Both typesetters use photographic paper for output in all three resolutions.

products allow you to get a reasonable printed representation of text and graphics you produce on the relatively-high-resolution Mac screen. In fact, several newsletters, including *Show Page* and *Mac Street Journal*, have been produced this way.

New Horizons

Now, several new products from Apple and other companies have fully developed the concept of desktop publishing.

The most significant of these products is Apple's LaserWriter printer, which contains in its memory Adobe's PostScript, a graphics language that is to typesetting what the word processor is to writing and editing.

With a LaserWriter and standard Macintosh applications, you can print out anything you can produce on the screen, but instead of getting the 72-dot-per-inch (dpi) resolution of the Macintosh screen, the LaserWriter can produce output at 300 dpi.

In addition to providing higher-resolution text characters, the LaserWriter printer's built-in computer smooths out shapes that were originally created with a program such as MacDraw at lower resolutions. The result is text of almost typeset quality and graphics that display fewer of the imperfections that are typical of dot-matrix output. For example, the jagged edges of objects you create with MacDraw are much less noticeable when PostScript has tamed the shape.

Beneficiaries

Who is likely to benefit from this new brand of desktop publishing? Initially, the groups listed below will be among the beneficiaries. When two new typesetting machines that we discuss in this article become available from Allied/Mergenthaler Linotype, however, self-typesetting of a high quality—in the vicinity of 2500 dpi—will become an option (see "Output Devices").

- **Newsletter publishers:** Thousands of people and organizations that produce their own newsletters can do the whole job themselves.
- **Service bureaus:** Résumé and word-processing services will be able to give their clients a choice of typefaces and formats. Producers of

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FOR THE APPLE II

AZTEC C65/DEV (Developer's System) **$299**

This C compiler and software development system comes with C compiler, 6502 assembler, SHELL, overlay linker, UNIX I/O, Screen, and Graphics libraries, editor, utilities, and support for ProDos.

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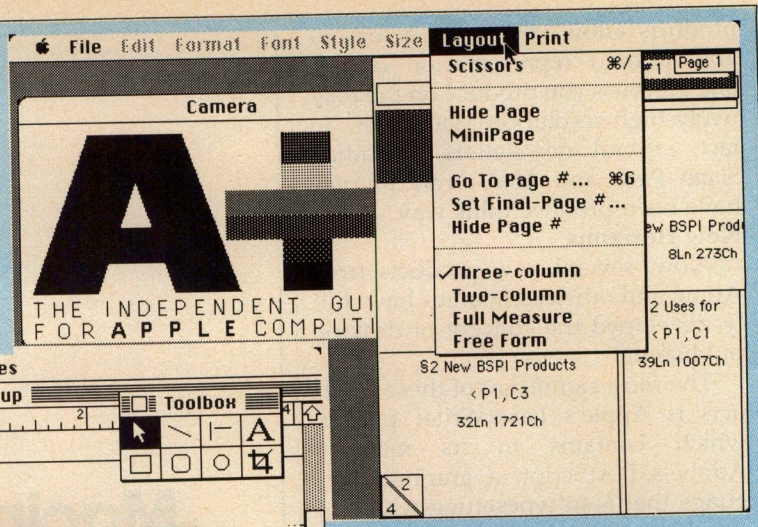
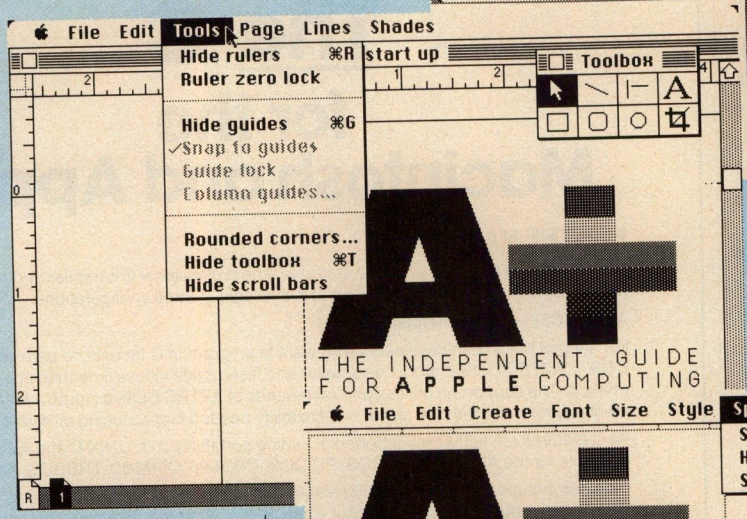
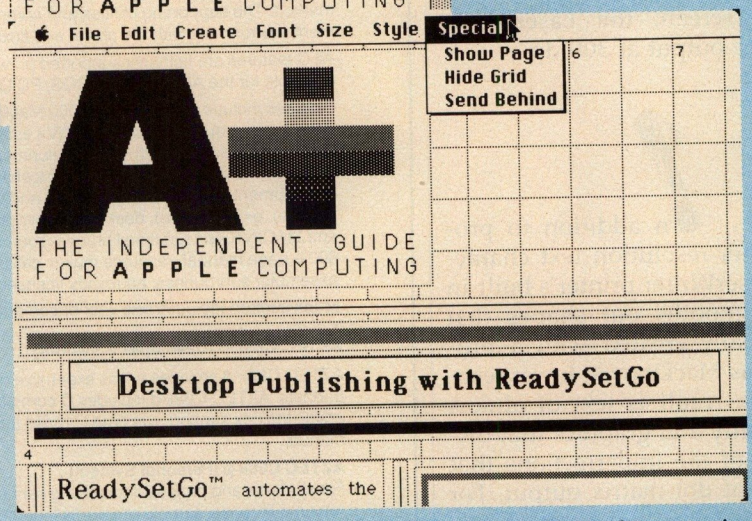
Software for Desktop Publishing







Above: MacPublisher from Boston Software Publisher
Left: Page Maker from Aldus
Below: ReadySetGo from Manhattan Graphics

In order to create documents that look their best on a laser printer or typesetting machine, you need to have software that supports typeset-quality fonts. Currently Apple is offering the following typeset-quality fonts: Times Roman, Helvetica, Courier, and a special symbol font. Later this year, Apple, in conjunction with ITC and Adobe, will introduce about 50 more fonts, including Avant Garde, American Typewriter, Bookman, Palatino, Zapf Chancery, and Zapf dingbats. In order to employ these fonts, you must use a software program that allows you to install new fonts with the Font Mover utility.

Desktop-publishing software currently falls into three categories: word-processing software, graphics software, and page-layout software. Programs for word processing include MacWrite, Microsoft Word, and Jazz. All of these programs allow you to install typeset-quality fonts and also let you mix text with graphics, but none of them are as good at combining text and graphics as the page-layout software described below.

Graphics software that is suitable for desktop publishing includes MacPaint, MacDraw, and Microsoft Chart. Each of these programs has its own particular virtues, and you may well end up using all three. Digitizing devices such as the ThunderScan or any of the several digitizing cameras available are an excellent addition to a desktop-publishing system since they allow you to bring logos, drawings, pictures, and other images into the Mac easily for image processing. (We'll be reviewing these devices in an upcoming issue of *A+*.)

Although MacPaint may be easier to use than MacDraw, note that MacDraw can produce a published image of much higher quality than MacPaint can. The difference in quality is because the maximum resolution of MacPaint is the same as the resolution of the Mac screen, which is 72 dots per inch, but MacDraw can create output at the maximum resolution of the output device—300 dots per inch with the laser printers and up to 2540 dots per inch on a typesetting machine.

We are currently aware of three page-layout programs that turn the Macintosh into an electronic page-composition system. The programs are ReadySetGo from Manhattan Graphics, MacPublisher from Boston Software Publishers, and PageMaker from Aldus. These programs allow you to create professional-looking published materials that include text and graphics created with other programs (see figures 1–3). All of these programs work with the LaserWriter and other PostScript-compatible output devices, and all of them are simple to use. None of the programs utilize the full power and flexibility of PostScript, however. *A+* will be taking a closer look at these programs in the months ahead.

business forms will be able to provide fast turnaround to their customers.

- **Cottage-industry vanity publishers:** Until and if the vanity presses avail themselves of this technology, anyone with a Macintosh and a LaserWriter can provide nearly the same preprinting services to would-be authors at considerably lower cost.
- **Existing publishers:** Publishers that do not already have expensive page-makeup systems can use the LaserWriter to produce drafts for page layout and galley proofs for writers and proofreaders.
- **Small presses:** These organizations usually operate on a shoestring. After a one-time investment in a Macintosh, LaserWriter, and page-layout software, literary journals, for example, can produce inexpensive, professional-looking results.
- **Documentation departments:** If the documentation departments of high-technology companies don't spend a small fortune typesetting their manuals, they often crank them out on a letter-quality printer. Documentation that is photocopied from letter-quality or line-printer output has a ponderous technical-manual appearance. With the LaserWriter/Macintosh combination, documentation departments can quickly produce near-typeset-quality manuals. Macintosh-software developers will find this technique especially appropriate, since it lets you generate Macintosh screen dumps and merge them into the documentation, using PageMaker, ReadySetGo, or MacPublisher (see "Software for Desktop Publishing," page 124).

Contract documentation houses that have a LaserWriter may develop an edge over their competition. Documentation firms—or any company that can spring for one of the Mergenthaler laser typesetters from Allied Mergenthaler Linotype—will have a self-contained publishing operation.

Ecumenism

Bruce Blumberg, Apple's LaserWriter product manager, says that the LaserWriter is "very ecumenical. It hooks up to anything that can generate PostScript code." Thus, the LaserWriter is not dependent solely on the Macintosh.

The printer has an RS-232 connection as well as an AppleTalk connection. When software that can produce

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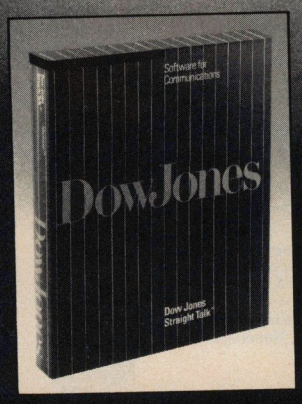

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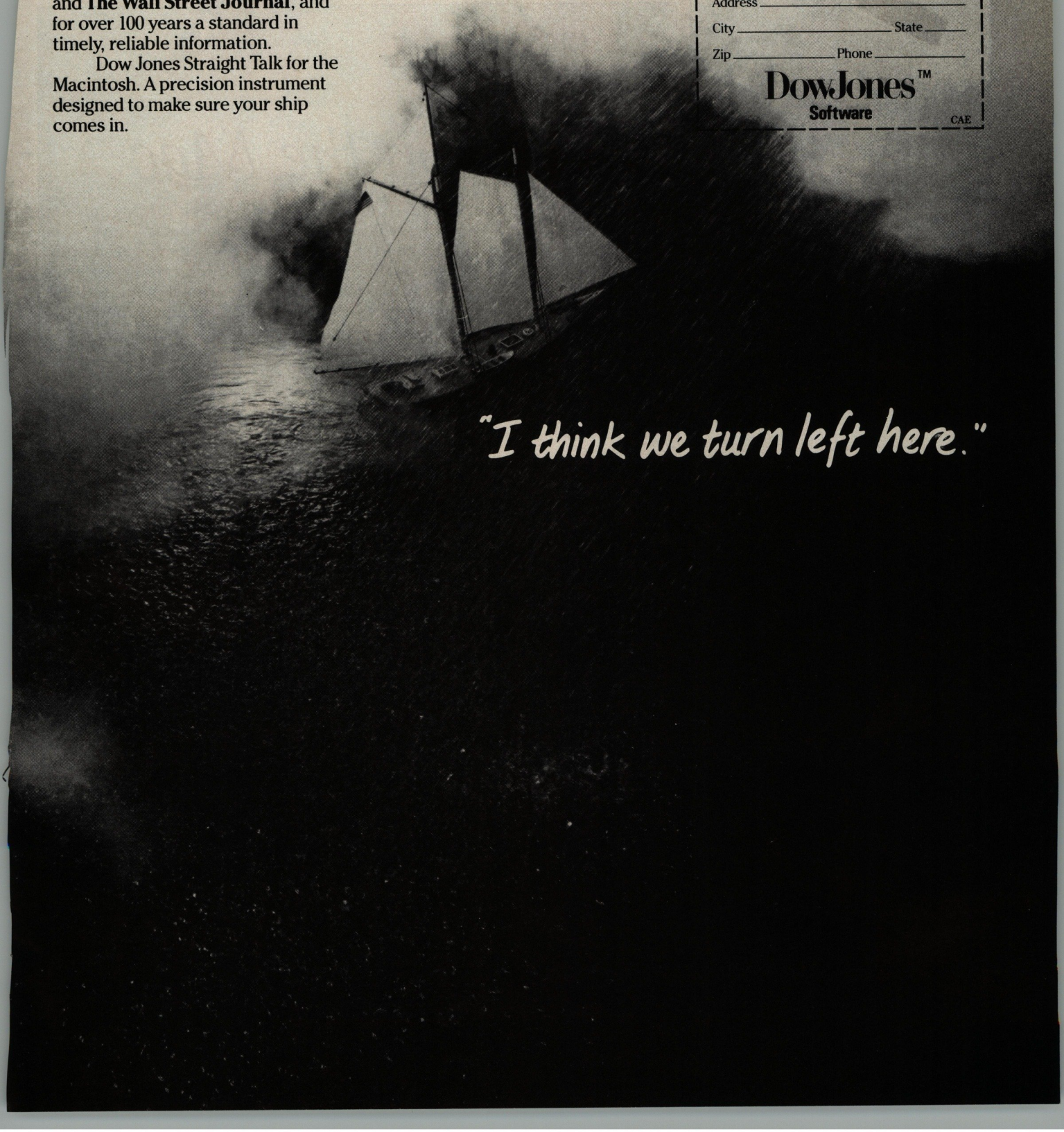

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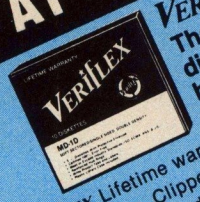

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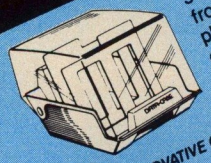

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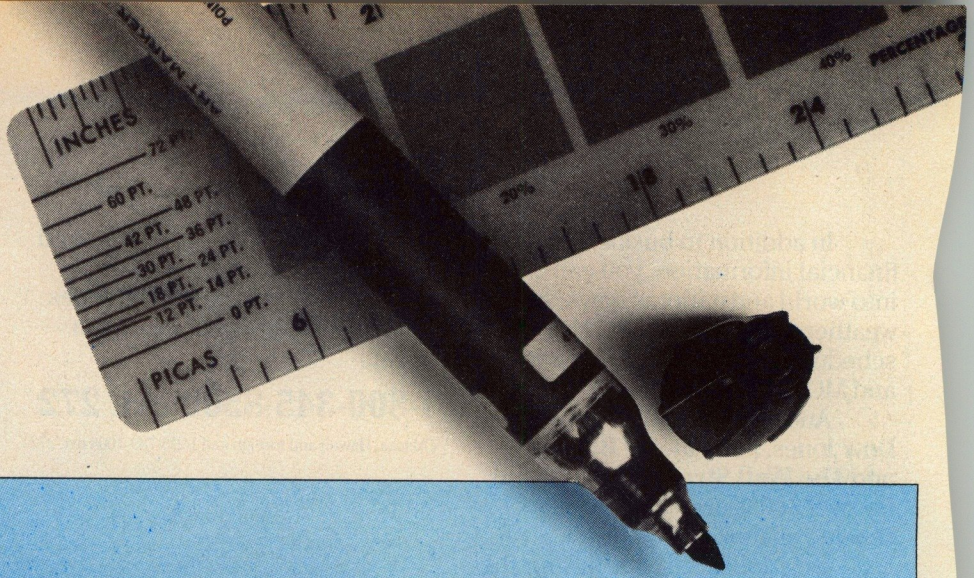

TeX on the Mac

Perhaps the best link between the Macintosh and the LaserWriter will be TeX, the typesetting language invented in 1978 by Stanford's Donald Knuth, widely regarded as the world's foremost computer-science authority. TeX contains features such as automatic hyphenation, line breaks, and page-break capabilities that far exceed those of any other software. It is well suited for complex text-processing tasks such as book production.

Page-layout software such as PageMaker, MacPublisher, and ReadySetGo requires you first to write the text; then to create the graphics, if any; and, finally, to call up a new program to format the text and bring in the graphics.

With TeX, on the other hand, documents you've created on virtually any computer or word processor can contain embedded formatting commands that will generate completely-laid-out pages in any of a variety of user-specified formats. TeX is a rich and powerful language. One of its handiest features is that it lets you create custom macros, which enable you to issue a single command. These macros represent lists of commands that instruct the output device to format large blocks of text automatically.

At least two companies are now working on TeX for the Macintosh, together with automatic conversion utilities that will change its output into the PostScript commands that the LaserWriter, the Linotron 101S, the Linotronic 300, and other PostScript-compatible devices can recognize.

One version of TeX reportedly is being developed by a company called TextSet for release later this year. TextSet is also working on a TeX-to-PostScript support package that will come out at the same time. This product will allow integration of graphics into the final output.

Kellerman & Smith is another company that will also release TeX for the Macintosh later this year. It plans a screen-preview driver and a driver for the Imagewriter, both of which will make calls to the Macintosh's built-in QuickDraw routines. A large collection of fonts, known in the TeX world as AMR or CMR (computer-modern) fonts, will come with the product.

Compared to standard word-processing programs, TeX is particularly adept at hyphenation, typesetting tables, and complex mathematical constructs and equations.

TeX already exists on many large computers and is soon to be released for the IBM PC. (Addison-Wesley has announced a product called Micro-TeX for the PC, and another company, Personal TeX, has a product called PCTeX.) On the Macintosh, TeX will let ordinary users lay out entire books with relative ease.

PostScript code is developed for the Apple II or IBM Personal Computer, for example, these computers will also be able to drive the LaserWriter. Either the Apple II or the PC can be connected directly via the RS-232 serial port or can use an AppleTalk interface card, which Apple plans to release in the fall. Adobe, the creator of PostScript, has also released a product called TranScript that allows UNIX-based systems to use the LaserWriter.

Additionally, the Macintosh is not dependent on the LaserWriter for high-quality output. Allied Mergenthaler Linotype is producing versions of its Linotron 101S and Linotronic 300 typesetters that have PostScript built into them. When these typesetters are available late in the year, Macintosh users will be able to produce typeset output at resolutions up to 2540 dpi.

A likely scenario for a publisher will be to do layouts and galley work with the LaserWriter and then go to a typesetting machine for the finished work. Owners of the typesetting machines will be able to sell typesetting services to Macintosh users who can't afford to spend the $20,000–$40,000 that these printers will cost.

This new era of desktop publishing raises some questions, and the answers to them depend on the needs and viewpoints of the parties involved.

From the point of view of composition (i.e., typesetting), you cannot get real typeset quality by using the LaserWriter. You must use either the Linotron 101S or the Linotronic 300 to get true typeset quality. Three-hundred-dpi resolution is good, but it suffers in comparison to the Linotronics' superb output.

Nevertheless, many of the people who will use the Macintosh and LaserWriter for desktop publishing may find that they don't need true typeset output. What they can get with the LaserWriter will be impressive indeed, since its results are so much better than those of daisy-wheel printers, with their fixed pitch, static character spacing, and lack of graphics capabilities, and dot-matrix printers, with their low resolution and ill-formed, sometimes difficult-to-read letters. Furthermore, someone laying out a document with the Macintosh/LaserWriter and a page-makeup system will have total control over the appearance of the document.

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Rob Auster, marketing manager at Adobe, refers to the page-layout systems currently on the market as "first-generation" products. Ideally, Auster says, quality self-publishing requires "the guts of TeX (see "TeX on the Mac," page 128) with the interface of MacPaint."

Typesetting will soon no longer be an esoteric trade practiced only by a privileged and knowledgeable few. Computerized typesetting as specified by the page-description commands of the PostScript language, with its almost infinite flexibility, lets individuals set their own copy.

No longer need one person produce copy on a word processor, print that copy out on a daisy-wheel printer, and then give it to someone else to reenter all that text on the front end of a phototypesetter. That multilevel process often means the introduction of new mistakes by the person doing the typesetting, an individual often untrained in the original author's subject matter and thus unlikely to recognize many typographical errors.

Also, typesetting equipment, even if computerized, does not have error-checking facilities analogous to the spelling and grammar checkers that are available on microcomputers. Sometimes the only interface between the supposedly computerized phototypesetting front end and the phototypesetter itself is not even a direct link, but an antiquated paper tape. A completely new tape has to be punched each time a particular document needs an update.

With the release of the LaserWriter and its built-in PostScript, and with the advent of phototypesetters that are also PostScript engines, some people predict the death of the typesetting industry, or at least trouble for the members of typesetting unions. What we feel will happen, however, is that typesetting will become more accessible, creating more jobs. When word processing was introduced, it did not—as some doomsayers had

John Barry, a free-lance writer and editor, is coauthor of The Unofficial I Hate Computers Book. *Fred Davis is a senior editor of A+ and a specialist in computer typography. Michael Wiesenberg, a technical writer, is a contributing editor of* Dr. Dobb's Journal. *He also writes for various computer and gaming publications and is the author of* Free Money: How to Win in the Cardrooms of California.

predicted—make secretaries obsolete; it just moved some of them from a typewriter to a terminal. What *did* happen was that more documents were produced. With the proliferation of PostScript and computerized typesetting software, we'll see more good-looking documents.

Since this aspect of the Macintosh Office System promises ongoing innovations, we'll keep you apprised of further developments. ✚

PRODUCT INFORMATION

Jazz
Lotus Development Corporation
55 Wheeler Street
Cambridge, MA 02138
(617) 492-7171
List Price: $595
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Lasergrafix 1200
QMS
P.O. Box 81250
Mobile, AL 36689
(205) 633-4300
List Price: $24,095; PostScript controller, $5000
CIRCLE 367 ON READER SERVICE CARD

LaserWriter, Imagewriter
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
List Price: LaserWriter, $6995; Imagewriter, $595
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Linotron 101S, Linotronic 300
Allied/Mergenthaler Linotype
201 Old Country Road
Melville, NY 11747
(516) 673-4197
List Price: Linotron 101S, $19,950 without PostScript; Linotronic 300, $38,950 without PostScript (PostScript will add about 20% to the price)
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MacPublisher
Boston Software Publishers
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Boston, MA 02132
(617) 327-5775
List Price: $99.95
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MacWrite, MacPaint, MacDraw
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
List Price: MacWrite and MacPaint, bundled with Macintosh; MacDraw, $125
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Microsoft Word, Microsoft Chart
Microsoft, Inc.
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
List Price: Word, $195; Chart, $125
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PageMaker
Aldus Corporation
616 First Avenue, Suite 400
Seattle, WA 98104
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List Price: $495
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PostScript Language Manual
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Palo Alto, CA 94303
(415) 852-0271
List Price: $30
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ReadySetGo
Manhattan Graphics
163 Varick Street
New York, NY 10013
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List Price: $125
CIRCLE 375 ON READER SERVICE CARD

TeX-to-PostScript device driver
TextSet
416 4th Street
P.O. Box 7993
Ann Arbor, MI 48107
(313) 996-3566
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Macintosh TeX
Kellerman & Smith
2343 45th Avenue
Portland, OR 97215
(503) 232-4799
List Price: to be announced
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ThunderScan
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Feed your Mac.

Introducing ThunderScan.™

Now you can turn any printed image into a detailed, high-resolution Macintosh graphic.

Just roll your original into your Imagewriter.

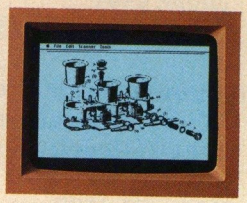
ThunderScan scans and digitizes the image.

Presto! A high-resolution MacPaint document.

No doubt about it, Macintosh is one great graphics machine. But until now, Mac graphics have been limited to what you can draw with a mouse and what someone else has put on a disk. Consequently, taking full advantage of Mac's graphics capabilities has been tough. But now there's ThunderScan. The new optical scanning device that lets you feed your Mac a steady diet of graphics that are useful to you.

ThunderScan turns Mac's Imagewriter printer into an image reader. So you can digitize any printed image and turn it into a detailed, high-resolution MacPaint document. Anything, including forms, half-tones, photos, mechanical drawings, maps, floorplans, logos, signatures and more. From black and white and color originals. ThunderScan reproduces them at over 200 dots per inch and in 32 shades of gray.

ThunderScan's application software, written by Mac-team-member, Andy Hertzfeld, makes it an extremely versatile and useful tool. You can generate full-page images or selected parts of them. Enlarge and reduce them. Manipulate them. Control the contrast and brightness. Create your own personal image disk. "Cut" and "paste" images together, creating new documents. And print them out on your Imagewriter. Or send them by modem to another Mac. The possibilities are nearly endless.



No lights, no camera, just action.

What you see here is the complete ThunderScan system. You don't have to buy an expensive video camera. Just pop out your Imagewriter's ribbon cartridge, snap in ThunderScan and you're set. It can even work in the dark (maybe you can think of an application for that).

If you bought a Mac at least partly for its graphics, only to find you couldn't take full advantage of them, now you can. With ThunderScan.

At an introductory price of just $229, it's a small price to pay for a whole new graphics capability.

For more information or a ThunderScan of your own, see your dealer or call us today.

(415) 254-6581

ThunderScan

Thunderware Inc., 19 G Orinda Way, Orinda, CA 94563

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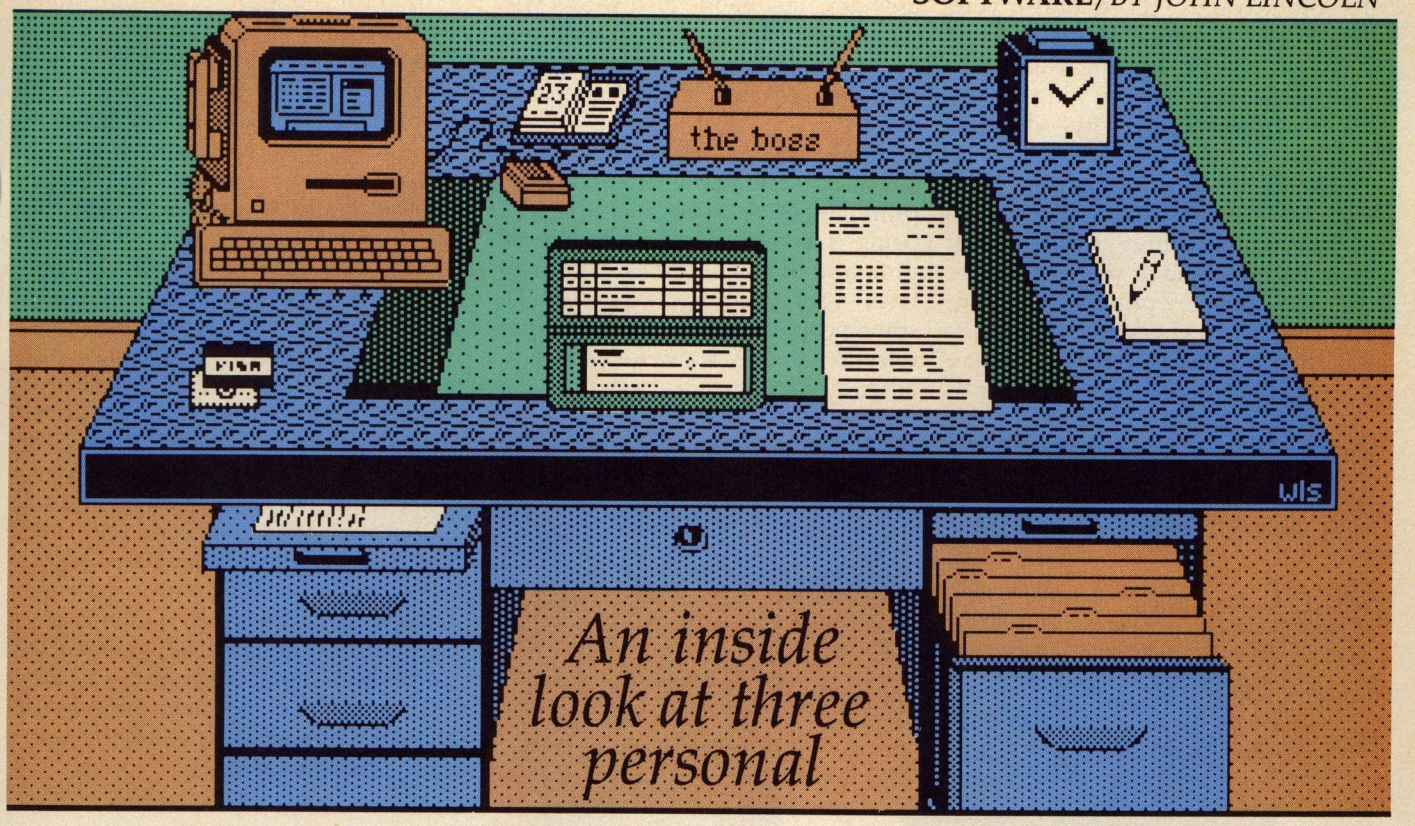


An inside look at three personal

Money-Management *Programs*

Did you go out and spend thousands of dollars on your home-computer system with the notion that you could actually use it, someday, to bring your personal finances under control?

You are not alone. Have you found a way yet to leverage your finances with your Mac, or are you still waiting for the right program to come along?

Relax. A growing variety of money-management software for the Macintosh is now reaching the marketplace.

The simplest approach to money management comes from ChequeBook by InterMatrix; a more powerful yet still easy-to-learn program is Electric Checkbook from State of the Art; and for those who can tolerate complexity in the pursuit of extra features, Dollars and $ense by Monogram may fill the bill.

Although these programs are similar in intention, they differ greatly in features and execution. Whatever your requirements—and your talent with numbers—one of these will be the program for you.

One Step at a Time

What each of us is looking for is a program that tracks our income and expenses; reconciles our bank activity; produces useful reports; is bug-free; and is pleasant to use.

These criteria mean different things to different people. Do you write 5 checks a month or 100? Do you have one bank account or several? Do you want a program to track your portfolio of common stocks and produce a complete financial statement and balance sheet? Do you require income forecasting and tax planning? Some programs offer more features than others, take longer to learn, and can justify their higher price tags.

ChequeBook

The easiest to set up and use of the three programs is ChequeBook from InterMatrix (the folks who make the MacPhone). This program starts with a main display designed to make you feel right at home—or, more specifically, like you're sitting comfortably at your desk (see introductory screen, above).

From this vantage point, you can access any of ChequeBook's operations, either by clicking on one of the desktop icons or by selecting from pull-down menus at the top of the screen. You click on the open drawer to activate the general ledger, click on the notepad to generate a trial balance, and so on.

ChequeBook has 100 general-ledger accounts, including ten deposit accounts. The program suggests ten account names (mortgage, utilities, groceries, and the like), but you can easily reconfigure them. After setting

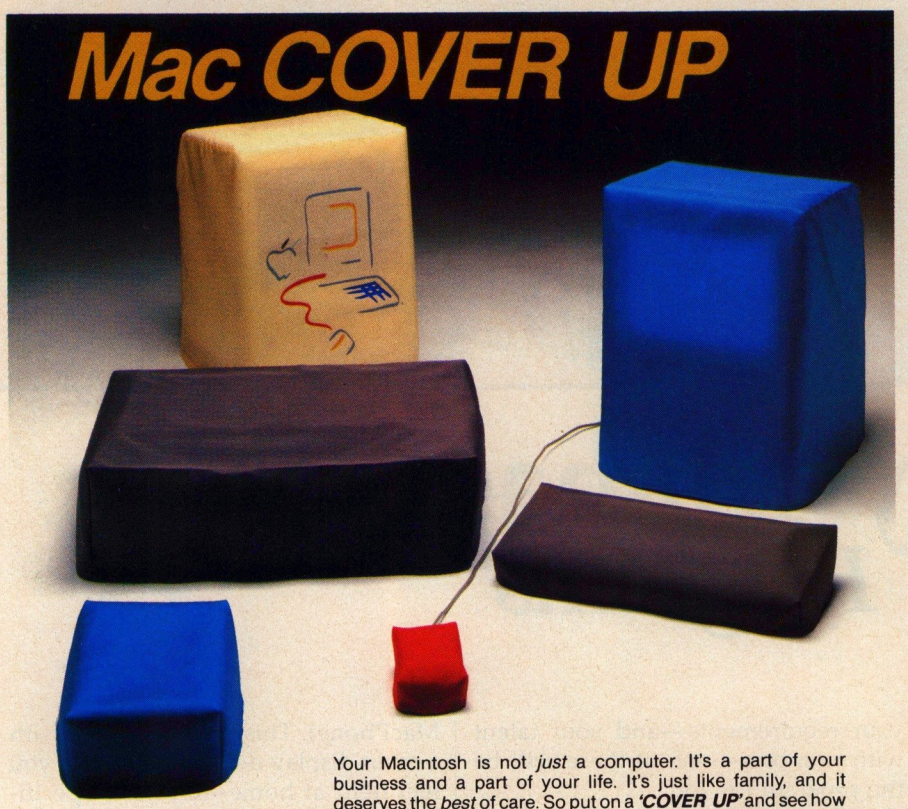
GRAPHICS COURTESY OF INTERMATRIX

up your accounts, you establish your period end (calendar or fiscal year) and then enter a starting balance in your check register. Now you're ready to enter checkbook activity—deposits and disbursements.

ChequeBook can manage your credit-card expenses, as well as multiple checking accounts. At the end of your fiscal/calendar year, you close out your books by printing your general-ledger and check-history reports and then transfer your categories to a new data disk. The manual informs us that ChequeBook also works with a hard disk; if you used it with one, you would have to keep your copy-protected program disk in the internal drive.

Appealing as ChequeBook is, it has one potential problem: It does not print checks. As such, it is limited to being a computerized "check-stub" program that distributes and tabulates your running expenses. For some people, that's as much computerization as they want; for others, it's a handicap.

Mac COVER UP



Your Macintosh is not *just* a computer. It's a part of your business and a part of your life. It's just like family, and it deserves the *best* of care. So put on a ***'COVER UP'*** and see how great your Mac will look while being protected from dust and spilled liquids. ***'COVER UPs'*** are custom designed to fit like a glove, and yet allow very easy access to your Mac. With our ***'COVER UPs'***, you can arrange your hardware any way you like. An individual ***'COVER UP'*** is available for each component in your system. So after a long day with Mac, you won't have to rearrange your hardware when you shut down. Just ***'COVER UP'***. *Save time, and save your Mac,* in one of seven beautiful colors, from tan to blue to bone (same as the color of the Macintosh).

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MACINTOSH SETS		
#M1	Macintosh, KYBD, Mouse, Imagewriter	$29.95
#M2	Macintosh, KYBD, Mouse, Imagewriter, and Ext. Disk Drive	$31.95
#M4	Macintosh, KYBD, Mouse, Imagewriter, Ext. Disk Drive, and Numeric Ten Key	$32.95
MACINTOSH XL SETS		
#L1	Macintosh XL with Profile Piggyback	$25.95
#L2	Macintosh XL 2/5, 2/10	$23.95

Set #	Contents	Sug. Retail*
APPLE IIc SETS		
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#C2	Apple IIc KYBD, Monitor, and Ext. Disk Drive	$24.95
APPLE IIe SET		
#E1	Apple IIe KYBD, Monitor, and Ext. Disk Drive	$25.95
#E2	Pro Model with Duodisk	$25.95

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If you need more from your money-management software, read on.

The Bigger Battle Shapes Up

If ChequeBook is a lightweight financial manager, Dollars and $ense is undeniably a heavyweight.

Dollars and $ense has been on the market nearly as long as the Mac itself, and its head start has established it as a best-seller and unchallenged champion of Macintosh money-management software. Today, however, you have a choice, and you may find a different program that has all the features you want—at a lower price. You might, in fact, prefer a "middleweight" program, Electric Checkbook from State of the Art, Inc.

Both Electric Checkbook and Dollars and $ense are cash-based, double-entry bookkeeping systems, which means that a transaction in any account is simultaneously entered in at least one other account. If two accounts are involved, then the sum of the debit entries must equal the sum of the credit entries.

For example, suppose you sell your car and deposit the funds in your savings account. You simultaneously debit (decrease) your Assets account by the amount of the sale and credit (increase) the balance in your savings account by the same amount.

Double-entry bookkeeping allows for a relatively detailed and accurate set of financial reports. To take advantage of these programs' features, you must set up a "chart of accounts" identifying your various assets, liabilities, types of income, and types of expenses. All your financial transactions are debited or credited against these account categories.

Electric Checkbook

Electric Checkbook offers you a single set of "standard household" categories, as well as the option of creating your own. The program can manage up to five bank accounts on a 128K Mac, with up to 100 financial categories, 100 outstanding bills, and 400 checks. (You can obtain additional file space by using an external disk drive.) It can manage up to ten bank accounts on a 512K machine, with room for many more bills and checks.

Electric Checkbook generates several kinds of reports and prints form-

A PRINTER SO FAST YOUR APPLE WON'T KNOW WHAT HIT IT.

If you're hunting for the perfect printer for your Apple® II, IIc, IIe or Macintosh,™ there's one way you can't miss. Set your sights on the ProWriter™ 8510SR or 1550SR, from C.Itoh.

Because no matter what your application, this dot matrix printer does the job faster than any other in its price class. At only $629.

If it's data processing you need, the 8510SR zips out 180 cps, with 100 lines per minute throughput. You can also get draft quality at 120 cps and, as an added feature, beautifully sharp near letter quality printing as well.

For graphics work, the 8510SR prints a full 40% faster than others in its league.

And when it comes to reliability, the ProWriter never falls short of the mark. Because like every C.Itoh printer, the 8510SR has been rigorously tested and proven on the job. And it comes with a full year's warranty, backed by 350 service centers coast-to-coast.

With over a decade of experience, and the strong backing of its 126-year-old, $60 billion parent company, it's little wonder C.Itoh printers outsell the others by a long shot.

For more information on the ProWriter 8510SR or the wider carriage version 1550SR, see your C.Itoh dealer or call toll free 1-800-423-0300.

Or write C.Itoh Digital Products, Inc., 19750 South Vermont Avenue, Suite 220, Torrance, CA 90502.

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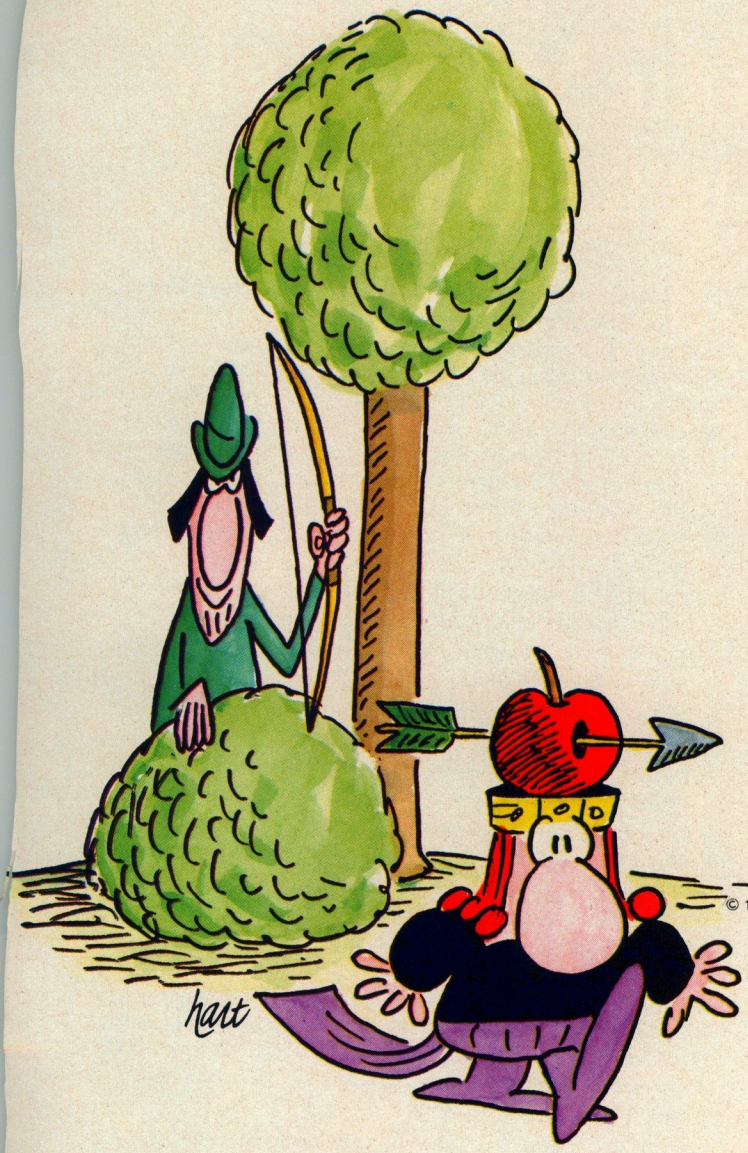

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C.ITOH
Printers

CIRCLE 296 ON READER SERVICE CARD

How to Keep Your Macintosh™ from Frying to a Crisp

Protecting Your Hardware From The 6,000 Volt Destroyer

Over 50% of all hardware and software complaints received by manufacturers have nothing at all to do with product quality. To the contrary, most damage reported is caused by surges in household or business current.

These surges continually degrade sensitive microcircuitry resulting in lost data and, even worse, computer repairs that are often mistakenly blamed on original equipment failure.

30,000 Volts At The Tip Of Your Finger

Another common danger to the computer, its peripherals and software, is static electricity. Few people realize that their bodies can carry as much as 30,000 volts of static.

The discharge of static electricity through the operator's fingertips can pose just as great a threat to your system as power line surges.

The Faulty Ground

In addition to operator safety, a properly grounded computer is better able to drain off charges that would otherwise create dangerous voltage levels between the computer's chassis and microcircuitry. Again, the operator is typically not aware of whether the outlet is properly grounded and therefore risks both the operator's safety and hardware damage.

RFI Can Play Havoc With Your Image

While RFI (Radio Frequency Interference) is not a source of damage to computer or operator, it can play havoc with the monitor image and to software. RFI is caused by nearby radio stations, the operator's own radio or television, as well as other electrical devices. RFI shows up on the monitor as a scrambled image and may also appear as data that has been garbled while in memory. If for no other reason, the computer operator should guard against RFI simply because its effect can nullify the time saving benefits provided by the computer.

MacGard: Real Protection For The Serious User

MacGard from Systems Control is the single most complete computer protection device available today. From its inception, MacGard was designed with Macintosh in mind. From its quality injection molded plastic casing which compliments your Macintosh's appearance, its at your fingertips convenient placement on the side of your unit, and its combination of superior protection features, the MacGard is the ultimate system accessory for your Macintosh.

MacGard provides the serious user with a complete series of protection benefits.

- It clamps off all line to line and line to ground surges *before* they can enter your system.
- It provides an anti-static pad you need only touch to safely drain off harmful static.
- It provides an LED light to indicate proper ground of your electrical outlet.
- It provides RFI attenuation to assure a clean monitor image and software safety.
- A master on-off switch provides convenient control to power up your computer and two other peripherals.
- MacGard has a one year limited warranty.
- If you're not satisfied within 30 days, return MacGard for a full refund.

If you're a serious user, you owe it to yourself to own a MacGard. Your MacGard can only be purchased directly from Systems Control. Cost of the MacGard is $89.95 plus $3.50 for shipping and handling. To order or request more information, call toll free, 1-800-558-2001 Ext. 115, in Wisconsin, 1-800-242-3102 Ext. 115. We accept both Visa and MasterCard. No. C.O.D.

Systems Control P.O. Box 788 M Iron Mountain, MI 49801

MacGard looks and works equally well with the APPLE II, APPLE II+, APPLE IIe, APPLE III, and the APPLE LISA.

MacGard™

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MacGard is designed to surpass operating requirements for category A as outlined in IEEE Standard 587-1980, "Guide for Surge Voltages in Low-Voltage AC Power Circuits."

CIRCLE 267 ON READER SERVICE CARD

fed checks. One type of report is an income statement (profit/loss) that shows the difference between all your income categories and expense categories. It shows whether you're making or losing money. Another report, a balance sheet, compares all your assets and liabilities to give you an indication of your net worth and also produces a record of checks, deposits, and adjustments.

A unique feature of Electric Checkbook is a routine that allows you to record your bills before you pay them, which gives you a sort of cash-requirements report at any time. You can either write checks by hand or pay selected bills from this list, sending the data to your printer, where your continuous-feed checks are waiting. Regrettably, the program does not print the payee's address on the check.

Electric Checkbook can post an expense to as many as 5 accounts—compared to 3 in ChequeBook and 12 in Dollars and $ense. Thus, you can distribute the expenses represented in a single check—to a credit-card company, for example—to a variety of expense categories.

Electric Checkbook is very "Macish" in execution, which makes it a pleasure to use. You use the mouse for the Cut, Paste, and Copy functions. Undo Entry is available, and you can bring up a Help screen for any task from within the program. To move between windows, you don't have to close the active window first.

Dollars and $ense

Is your yen for high-powered financial management satisfied yet? If not, this next program will do the job.

It's Dollars and $ense, and a list of its features and suggested applications makes the program sound like an office full of high-priced accounting talent.

For example, not only can you budget your cash flow with Dollars and $ense, but you can also produce a graph that shows how your actual and projected cash flows compare.

"What if" routines that you can apply to your income and expenses let you test different financial approaches. Furthermore, the publisher, Monogram, offers a companion program called Forecast that reads Dollars and $ense data files to produce tax-planning strategies. With this tool, you can examine in advance the tax consequences of various income/expense scenarios.

Dollars and $ense offers three predefined sets of "standard financial categories": household, business, and tax preparation. You can modify any such category or design your own. It has room for up to 120 accounts and can manage as many as 12 checking accounts.

The 140-page manual describes applications for the program beyond simple checkbook management. It suggests, for example, that small, service-oriented businesses can use the program professionally for client billing, record keeping, or expense-account management. It also says you can use the program to manage an investment portfolio of stocks and bonds, and it shows how to maintain a complete household inventory for assessing your true net worth.

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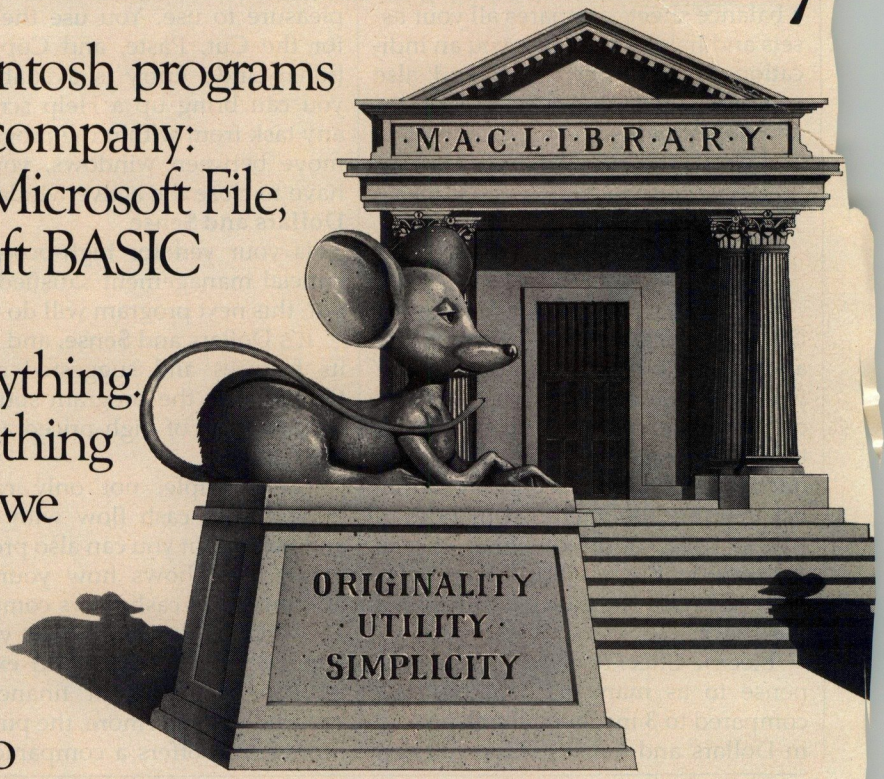
The first library



We've written more Macintosh programs than any other software company:

Microsoft® Multiplan,® Microsoft File, Microsoft Word, Microsoft BASIC and Microsoft Chart.

But we can't write everything.

So when we find something really excellent out there, we publish it.

Every program has to sweat out an interview.

Because we've begun to build up an impressive body of Macintosh work, we founded Microsoft MacLibrary™ programs to house them.

Programs for business, for learning, for fun.

And these disks can't just roll in off the street. Each program has been exhaustively reviewed, previewed, and scrutinized.

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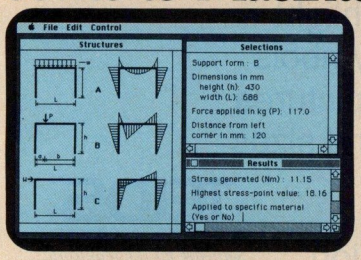
Our first releases.

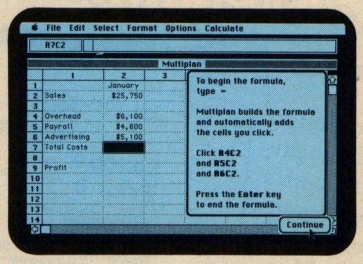
The renowned programming language, Logo, has now come to Macintosh. A mainstay of university curriculums, Logo teaches programming concepts, techniques, and problem solving strategies. And it makes it all fun to boot. Intriguing enough to challenge even an advanced programmer—or motivate a child—this is Logo's latest

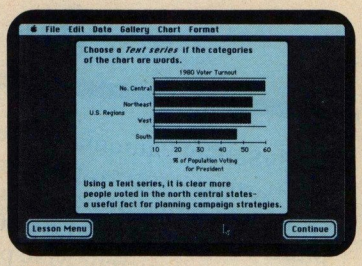


Logo by Logo Computer Systems Inc.

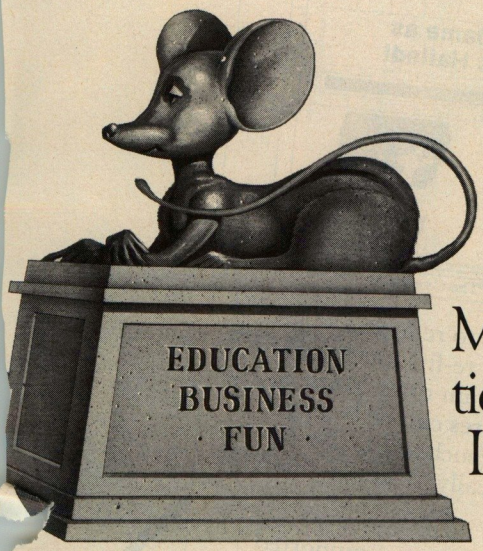
dedicated to Macintosh.™

generation. And it takes full advantage of all of Mac's easy to use features.





Learning Microsoft Multiplan® and Microsoft Chart by Micro Courseware Corp.



Learning Microsoft Multiplan and Microsoft Chart is a superb interactive instructional program by Micro Courseware Corp. It walks you through the basics and into the intricacies of these sophisticated business tools. Teach yourself quickly and simply how to produce presentation quality graphics. As well as what-if projections, portfolio managers, and financial models.

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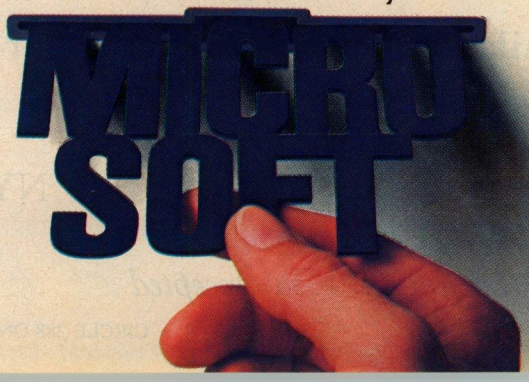
For a list of your nearest dealer stocking MacLibrary software, just call (800) 426-9400. Or in Washington State, Alaska, Hawaii and Canada, call (206) 828-8088. We think you'll be impressed. Because making it into MacLibrary speaks volumes.



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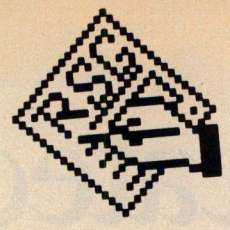

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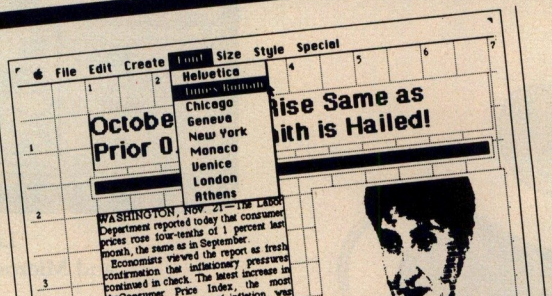

display instantly updates to reflect changes and text automatically re-fits the block. Graphics blocks can contain rules, borders, solids or pictures. **Pictures** can be brought in from other programs (such as MacPaint). All graphics automatically scale as their block is re-sized.

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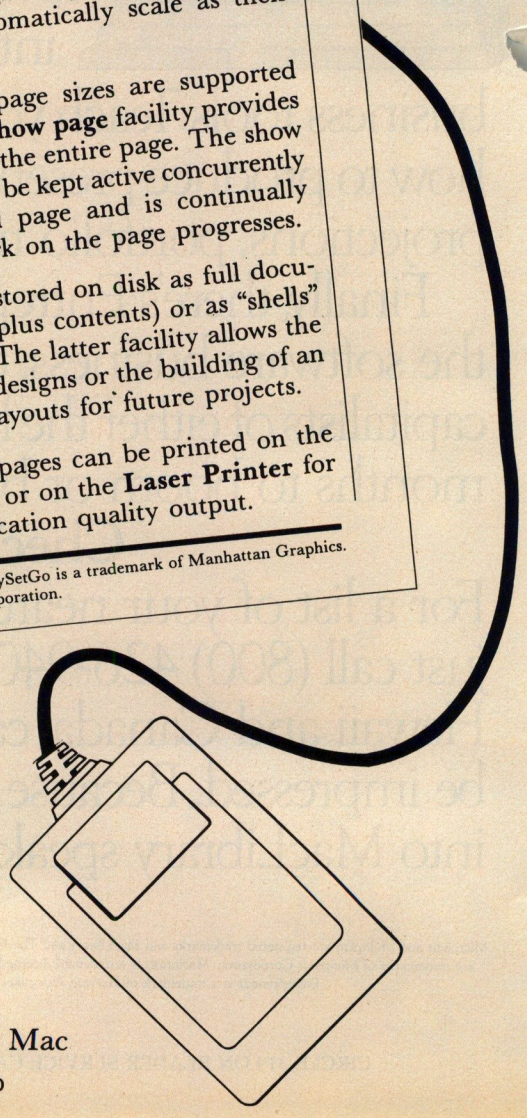

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To use Dollars and $ense effectively, you must understand debits and credits and some basic principles of accounting theory. With this program, you do not manage just a checking account—you manage many. You have an account for each of your credit cards; an account for each asset, liability, and personal checking account; and an individual account for your stock portfolio, your mortgage, and your payroll taxes. If you hesitate to confront your personal finances in such detail, then you may find Dollars and $ense a bit overwhelming.

The manual claims that "Dollars and $ense can produce seven different kinds of reports of every aspect of your financial life." That may be so, but I never got far enough with the program to find out. The fact is, I found many of the explanations and routines obscure and complex. Besides, I'm not sure I want "seven different kinds of reports of every aspect of [my] financial life."

Obscure? In entering checks and deposits into your check ledger in Dollars and $ense, you can indicate whether your entry is "tax-related." I was unable to learn whether this designation meant tax-deductible, as an expense item, or taxable, as an income item.

At Last, the Bottom Line

Each of us has a different point of view, and Dollars and $ense may suit you just fine. It's been the best-selling business program for the Macintosh for many months, and it certainly is packed with features. If you are less than aggressive about experiencing the thrills of personal financial management, however, another program may suit you better.

ChequeBook will suit armchair analysts just fine, as long as they are content to continue writing checks by hand. At its newly reduced price of $54.95, it's definitely attractive.

My personal favorite among these three is Electric Checkbook. You really can learn to use it in less than two hours. The breadth of information it produces will surprise you, and it does print checks.

Like all the best Macintosh programs, Electric Checkbook gently guides you through a logical succession of steps toward a satisfying resolution. For me, it provides the satisfaction that comes from understanding not only the condition of my personal finances, but also how this condition occurred and what it means. Electric Checkbook has earned a place on my desktop. ✚

Editor's Note: One important new program, The Home Accountant and Financial Planner from Arrays, Inc., did not arrive at our offices until after this article was written and therefore could not be included in the review. The Home Accountant is a solid program with many excellent features that make it useful for certain small-business applications, as well as home finances. When you are shopping for a financial-planning program for your Macintosh, be sure to compare The Home Accountant to the other three programs this article covers.

John Lincoln is a Macaholic who lives in Santa Barbara, California, with his wife, two children, and Macintosh.

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C-Worthy Compiler

Smooth sailing for programmers with Consulair C

Last month I presented a look at two early C compilers. This month we'll take a close look at one that, in my opinion, provides the first quality programming environment for the Macintosh. That product is Consulair C.

Consulair is a company whose guiding light is William Duvall, the man behind the Macintosh assembler (now called the Macintosh Development System). Indeed, Duvall used early versions of Consulair C to develop the assembler, and the assembler is integrally linked to the process of using the C compiler.

Creating a program with Consulair C is somewhat like the process of using the assembler (see figure 1). You use the Edit program from the Macintosh Development System (included with Consulair C) to create your source code. I really haven't written much about this editor, so let me remedy that now.

Edit allows you to edit multiple files at the same time. Normally you enter text in nine-point type, which allows 120+ columns across the screen—something that most programmers will find handy. You can scroll horizontally, which you'll need to do if your lines are longer than what can fit across the screen (see figure 2 for a typical Edit screen). The multiple-file ability is probably the best feature for programmers. I find it quite easy to copy pieces of text from one file into the source code I'm working with. That's a nice touch for Mac programmers, since you can reuse much of the Macintosh code you'll develop in other programs (with only minor changes). The initialization routines, for example, are easy to copy from one program to another, getting you right to the meat of your program.

In other respects, the Edit program works much like MacWrite does. The Cut, Copy, and Paste functions work just like they do in MacPaint and MacWrite, and the scroll bars work as you'd expect. The best part about Edit is the way it becomes your central focus during the development process. The Macintosh Development System includes an elaborate "job executive" function that allows you to invoke the assembler or linker directly from the editor. If an error shows up when you call the assembler, for example, you'll get the usual error messages, and then you'll end up back at the editor, with the error-message and source-code files both open and the latter ready to rework. On a Lisa—whoops, excuse me, Macintosh XL—the editor and executive make for a quick, convenient development environment, as good as any I've used on other microcomputers.

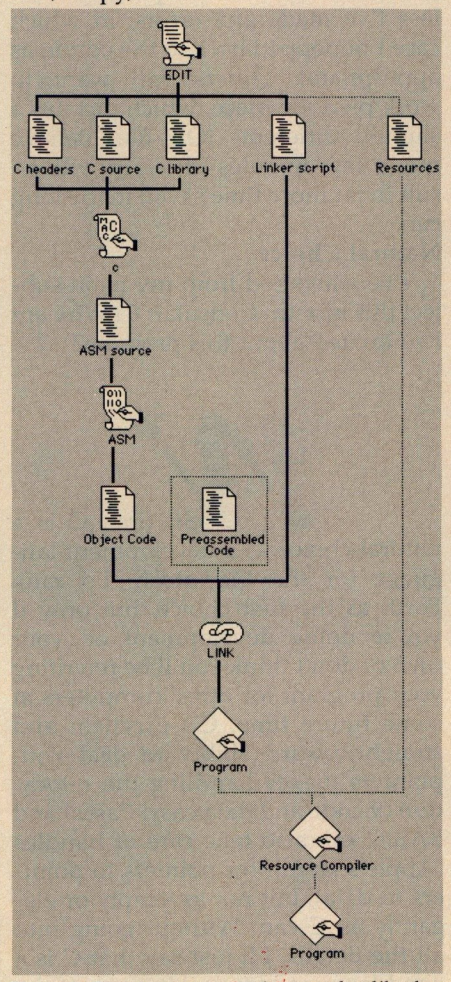

Figure 1: Creating a program is somewhat like the process of using the assembler.

Consulair C includes a job-executive function similar to, but not quite as capable as, the one with the Macintosh Development System. You can, however, create a .JOB file and load it as the first file in the editor, which will allow you to transfer control to the compiler or assembler and then return to the editor when you're done.

Because the job executive is so integral to convenient program development with both the Macintosh Development System and Consulair C, I strongly encourage all you amateur programmers out there to spend a good portion of your initial time with either product developing a usable .JOB file that works for you. The way I work with the assembler, I

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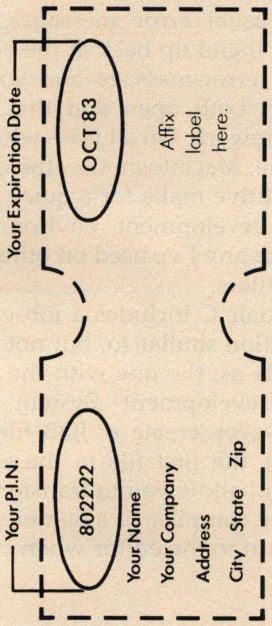

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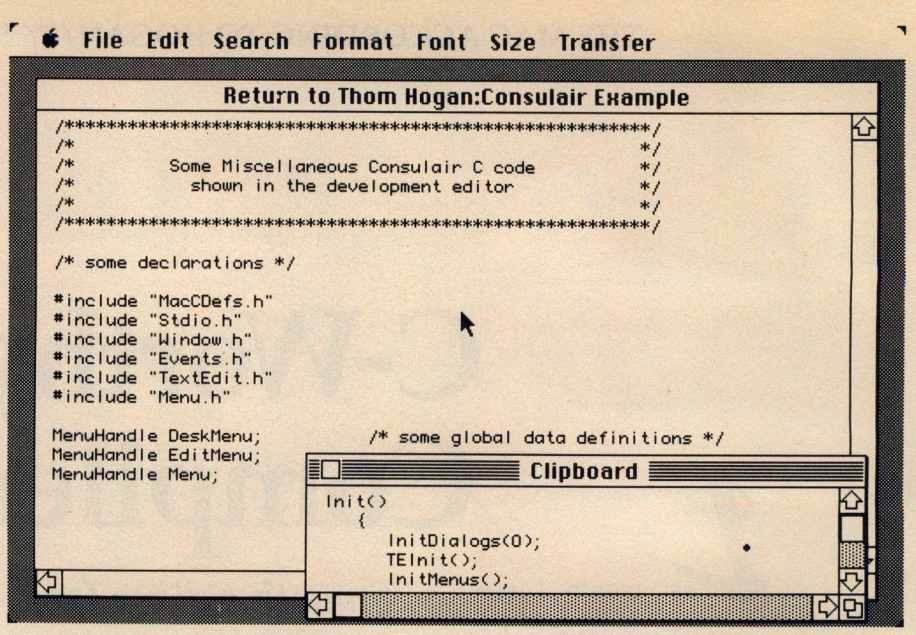

Figure 2: A typical Consulair C Edit screen

know that I will have finished all my source files (assembly code, link file, and resource file) before I invoke the assembler, linker, or resource compiler. Thus, I've created a .JOB file that whips through all the source code and creates the finished program (unless I've made any errors, in which case I'm popped back to the editor, as appropriate). Others will want to work piece by piece, which dictates a slightly different .JOB file. Believe me, a few minutes' thought will result in far more time saved in the long run.

Natural Choice

I've wandered from my main subject this month: Consulair C. Why am I so excited about this program?

Well, first, C is a natural choice as a development language for the Macintosh. I'd rank Forth as the first choice, but only if you're doing development on your own or don't think you'll be rewriting your program for other computers at some future time. C's excellent and straightforward ability to deal with pointers makes handling the relocation of code and data easy. Pascal and BASIC can also take care of handles (Apple's jargon for pointers to pointers to data), but not as simply or elegantly as C can. Without going into all the details, I'll just say that C is a good language for making use of the advanced programming features inside the Mac without a lot of memory overhead.

Consulair's version of C is the best C compiler I've seen so far for the Macintosh. I make this assertion for several reasons. First, Consulair C follows fairly closely the Kernighan and Ritchie standard for C. Most of the differences are extensions of what is considered standard C, and many of the others are simply Consulair's interpretations of what Kernighan and Ritchie describe in their book *The C Programming Language* (Prentice-Hall, 1979). The only two major problems most programmers will find in Consulair C are the lack of floating-point variable types and the lack of bit fields within structure definitions. If you don't know what those things are, you probably won't miss them (you can compensate for the lack of floating-point types by using one of the floating-point libraries available commercially or in the public domain, although doing so will mean typing a lot of code and doing some debugging).

On the plus side, Consulair C makes all characters in a name ("identifier" in C jargon) significant. For instance, Consulair C, unlike some other C compilers, correctly interprets names such as SetHandleSize and SetHandleRegion as being different. Consulair C allows "inline" assembly-language code, meaning that you can switch between assembly language and C pretty much at will in your C source code. It differs from some other C compilers in that it lets you use unsigned data

Consulair C is the first programming tool that has brought me further than just playing.

types (char, short, int, and long). If you are interested in program portability, you will want to know that you can define integers as either 16 or 32 bits in length. In sum, the differences between the hypothetical "standard" C and Consulair C are mostly minor and are nicely documented in the manual.

Yes, but what about Mac-specific concerns, you ask? No problem there, either. Consulair includes several libraries of code, one of which is the Macintosh traps. All the libraries are provided in source code, meaning that you can modify them to suit your needs, if necessary. I found more of the ROM routines predefined here than in any other compiler I've worked with so far. Better yet, the other library files that come with the compiler have some nicely written extensions to C that I've had to write myself when I used other Cs. Many of these extensions are related to string handling, although you'll find some other routines here, too, such as ClearBytes (clear memory to zeroes), FillBytes (fill memory with a character), and MoveBytes (move memory around). The amount of library source code here will keep you busy for a few days just examining it and learning how to use it.

A Manual for Initiates

The manual that comes with Consulair C is going to be a problem for programming beginners—it definitely will not teach you how to program in C. Indeed, if you're not pretty well on your way to C-manship, you'll find it confusing and disorganized. For those of us who are comfortable with C, on the other hand, the manual is fine. It tells you everything you need to know about this specific implementation of C, which means that most of the manual is devoted to essential background information such as which registers the compiler uses to pass arguments, how data is stored and where, and how the C control statements reduce to assembly-language code. All of this information, by the way, is something you'd normally have to dig up for yourself by doing some program debugging; I applaud Consulair for including it in its manual. Fewer than a dozen pages tell you how to actually use the compiler, but that's OK, since there isn't a lot to learn.

Good Code

What about the code Consulair C produces?

Well, I'm no whiz at optimizing 68000 assembly-language code, but what I have looked at seems to be reasonably good. Others I've talked to have had positive things to say about Consulair C's code, as well. The compiler reduces your C code into assembly language, which you then run through the Macintosh Development System assembler.

Consulair C works just fine on a 128K Mac, although if you're developing serious applications, you'll want to look into getting a hard disk or a Mac XL; source code has a way of growing to more than fill a single Mac disk. The copy of C you get with the package is copy-protected, but Consulair will send you an unprotected version for a signed license agreement and a few dollars (to cover the company's costs).

I've been playing at programming the Macintosh for over a year now, and Consulair C is the first programming tool (other than the assembler) that has brought me further than just playing. With a good tutorial, some better Macintosh-specific programming examples, and a floating-point library, Consulair C would be at the top of my programming chart. As it is, it warrants the attention of any serious Mac programmer. +

Thom Hogan is editor-in-chief of Business Software *and is the author of numerous computer books, including* InfoWorld's Essential Guide to the Apple II.

PRODUCT INFORMATION

Consulair C
Consulair
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List Price: $295, plus $175 for Mac Toolkit

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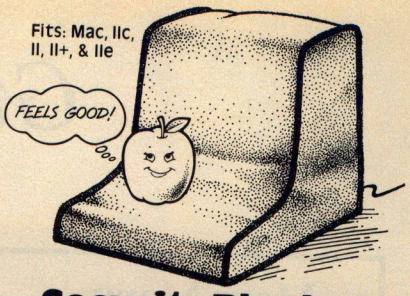

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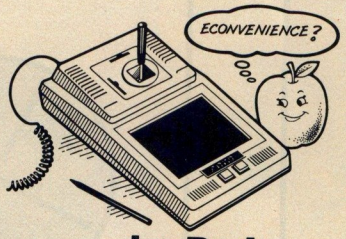

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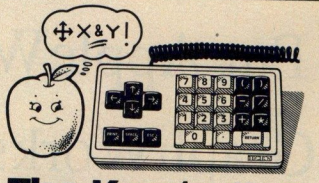

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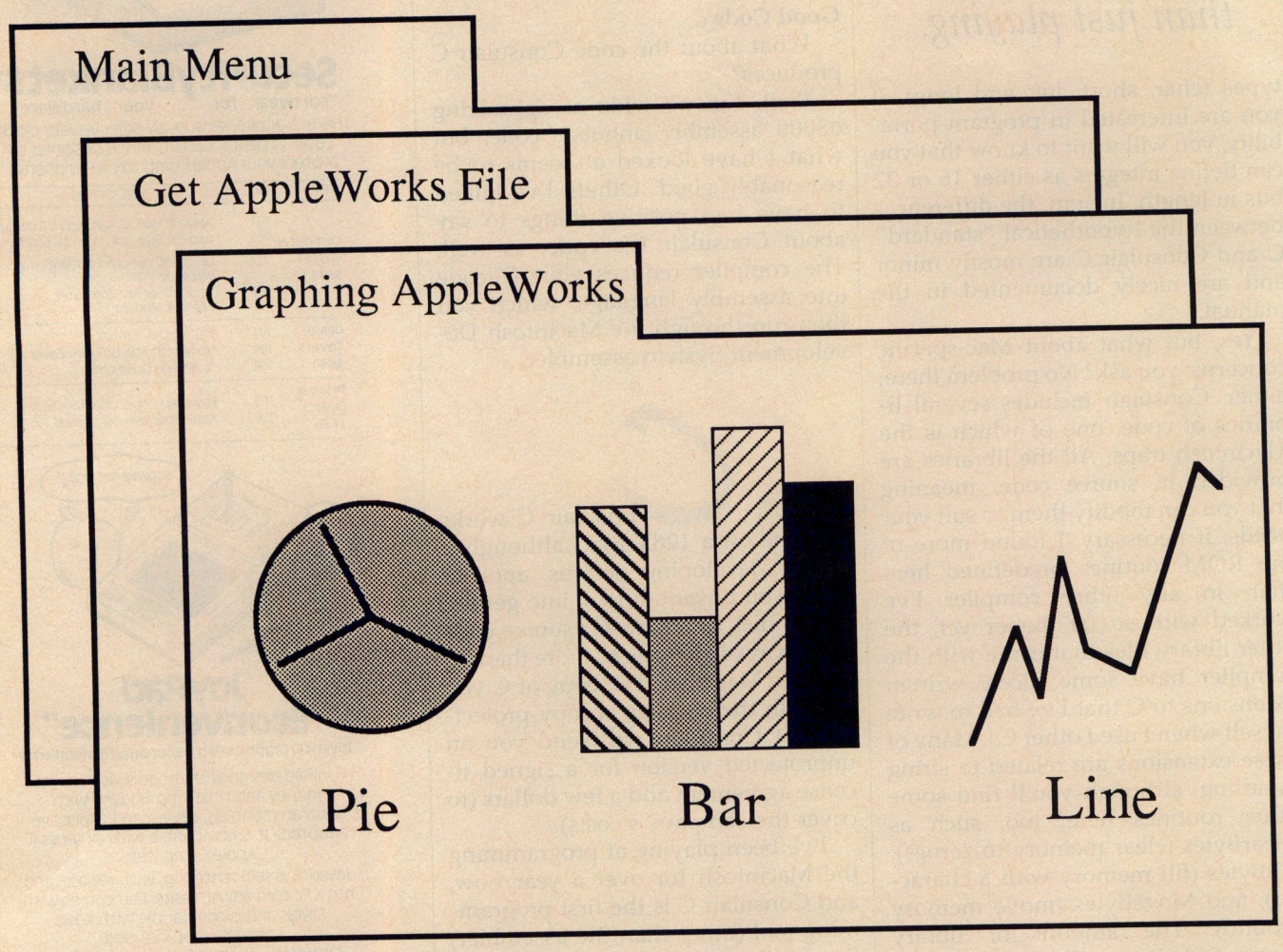

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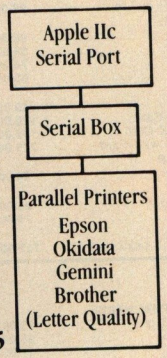

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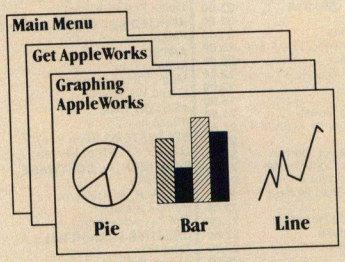

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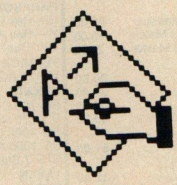

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RX-80 F/T +	Most Call
RX-100	Recent Call
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TAXAN	
RGB Vision III (Hi-Res)	399.00
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The Accountant	60.00
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CIRCLE 299 ON READER SERVICE CARD

MacTips

Suggestions from our readers

A SLICK MOUSEPAD

If you have admired some of the special pads and surfaces that you can buy to run your Mac mouse around on, consider saving yourself some money by making your own.

Go to a cooking-equipment store (or to the housewares section of a department store) and purchase one of the clear, thin-plastic chopping boards you will find there. You will probably find ones that have a rough cutting side and a smooth underside. Next, go to your local electronics or hardware store and purchase a set of Jumbo Rubber Pads or feet for protecting furniture from scratches. (Put them on the rough side of the cutting board.) Remove any decals, and you have yourself a super solid mouse board that reserves running room for your mouse on a messy desk, as well as providing it with a smooth, easy-to-clean surface to cavort upon.

If you leave the original rubber feet on the board, they will act as bumpers to remind you when your mouse is close to the edge. For the ultimate in smooth-running mice, wax the smooth surface of the cutting board with a hard car wax and polish well.

George A. R. Silver
Richmond, IN

PROGRAMMABLE CALCULATOR

The Mac's ability to copy and paste among various applications and desktop accessories allows you to simulate the operation of a programmable calculator. To "program" the calculator, open either the Notepad or a MacWrite document and type the calculator numbers and symbols you need to perform the calculation. Then select the text for editing by dragging the insertion pointer over it to make it appear white on black. Choose Copy from the Edit menu to copy the selected text onto the clipboard.

To execute the "program," get the calculator out of the desktop accessories. After you choose Paste from the Edit menu, the computer will tap in the text, just as if you had clicked it in yourself. The answer to the calculation will appear on the calculator display, where you can copy it onto the clipboard and paste it back into the notepad or MacWrite document (see figures 1–4.)

Steve Wille
LaGrange Park, IL

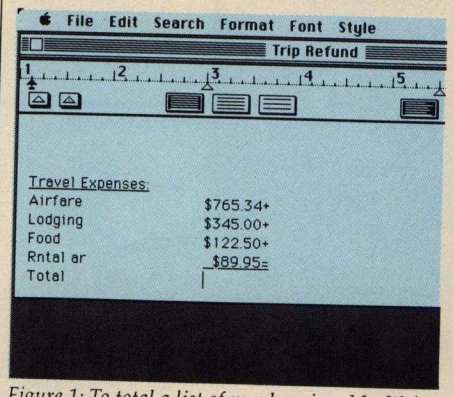

Figure 1: To total a list of numbers in a MacWrite document, first type in the numbers.

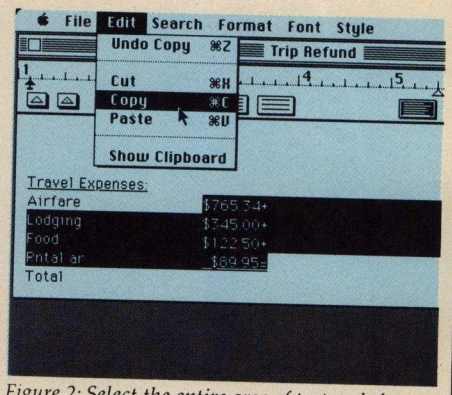

Figure 2: Select the entire area of text and choose Copy from the Edit menu.

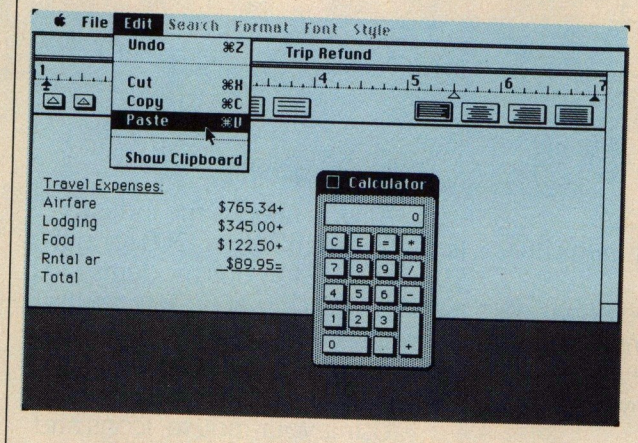

Figure 3: Get out the calculator and select Paste from the Edit menu. The total will appear on the calculator display. The calculator will beep as it encounters keystrokes such as letters of the alphabet, dollar signs, tabs, and returns, which don't mean anything to the calculator—it will ignore them. (Caution: The letters C and E do mean something to the calculator.)

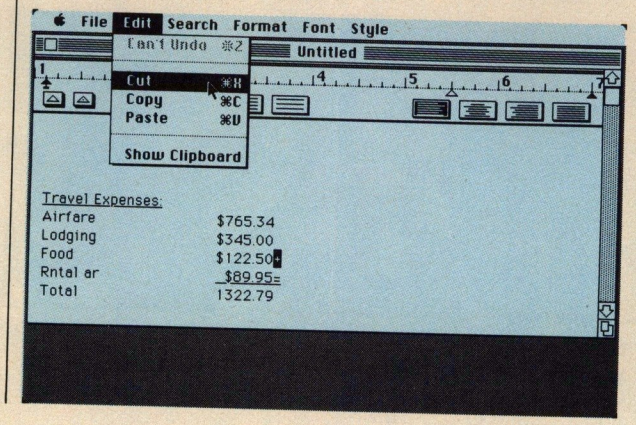

Figure 4: To put the answer back in the MacWrite document, choose Copy from the Edit menu, select your MacWrite document window by clicking on the title bar, and select an insertion point for the answer. Choose Paste from the Edit menu to insert the answer. You can clean up the text and delete the plus signs and equal sign by using the Change option from the Search menu and changing all the plus signs and the equal sign to blanks.

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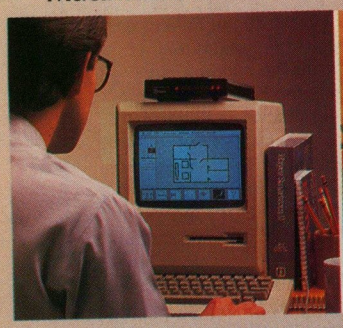
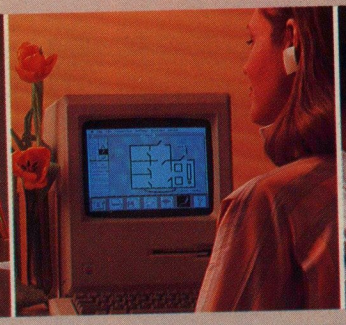
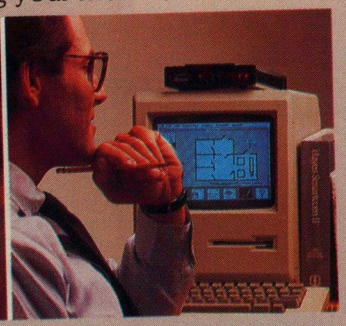


Atlanta, 3 P.M. "Here's the plan for the new space. What do you think?"



Boston, 3:04 P.M. "Looks good. But can you move the lounge over here, and add a second exit, like this?"



Atlanta, 3:05 P.M. "Brilliant! I'll incorporate these changes for tomorrow's meeting."

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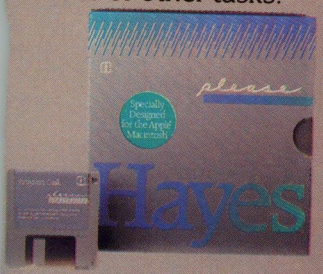
And *Please*.™ Mac-organize your data. Mac-nificently!

Hayes offers more than communications. *Please*, the easy-to-use yet powerful file management software, will be available for Macintosh soon. To manage mailing lists, print forms or handle dozens of other tasks.



Hayes for Macintosh. The smartest move you and your mouse can make.

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Hayes Microcomputer Products, Inc.
5923 Peachtree Industrial Blvd.
Norcross, Georgia 30092 404/441-1617
CIRCLE 166 ON READER SERVICE CARD

MacTips

BOLDER THAN BOLD

I have derived much enjoyment from my MacPaint application, but sometimes I want to use MacPaint to print text that is bolder than what the Bold command allows in MacPaint. You can create megabold letters by selecting the Bold option and then Outline. By using the paint bucket, you can fill these letters easily to achieve a much bolder look. You may have to use fatbits when you don't have enough room for the paint bucket to fill up the entire letter.

Louis Trotta

LACK OF MEMORY WITH TWO DRIVES

I had been using MacWrite on a startup disk in the internal drive and a disk with the MacWrite files in the external drive. I worked in this fashion for some time, saving and trashing files repeatedly from the file disk.

I suddenly started getting a message that there was not enough memory to work with a second disk.

In order to solve the problem, I examined the contents of the file disk with Mac Tools, discovering that the size of the invisible desktop file was 13K. I erased the desktop file and, after rebooting the disk and replacing the lost file folders, found that the desktop file had shrunk to 5K. Thereafter, I no longer received any lack-of-memory messages.

It seems that the Finder, in updating the desktop file, does not compress the desktop file by eliminating information that is no longer valid, causing the desktop file's size to continually expand.

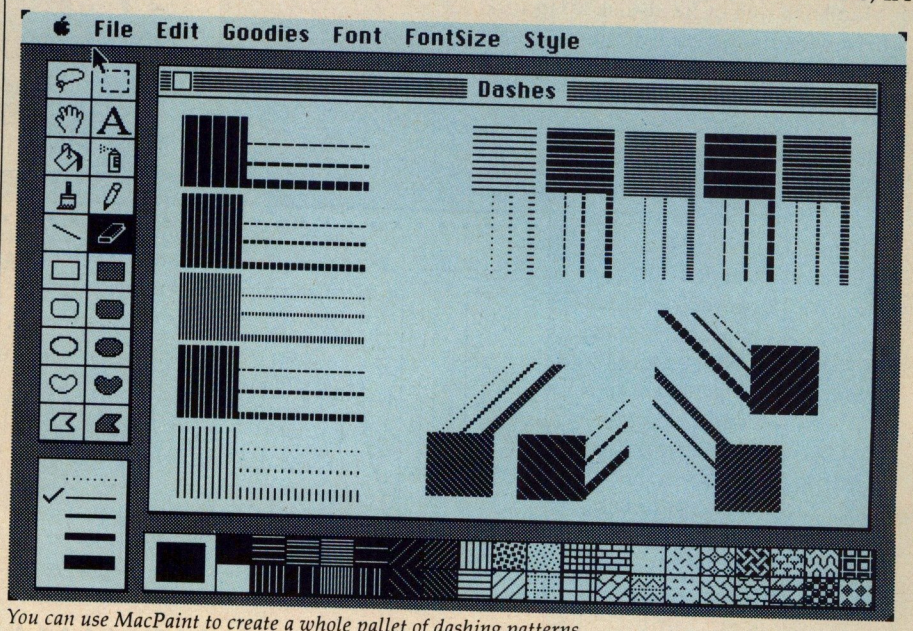
Anyone with a similar problem can cure it by using the same technique. If you do not have a utility program, you can boot the questionable disk while holding down the Option and ⌘ keys simultaneously. This procedure forces the Finder to reconstruct the invisible desktop file, thereby compressing it.

Norman Greenberg
Philadelphia, PA

DASHING PATTERNS

I was using MacPaint the other day to draw some flowcharts and had a need for dashed lines. I used the pattern-editing feature to create bars of various widths at 90° to the direction of the line I wanted to draw. Then I selected the pattern I wanted and held the Option key down while drawing the line. MacPaint draws dashed lines as easily as it does everything else. I ended up creating a whole pallet of these patterns to use in future flowcharts (see below). Once again, the Mac comes through.

Janet Hinners
Cedar Falls, IA



You can use MacPaint to create a whole pallet of dashing patterns.

A+ pipeline

II SERIES

▶ TRAVELMASTER APPLE IIc CASE

The TCI 2375 TravelMaster case is designed to transport the Apple IIc terminal, modem, disk drive, and mouse. The case is molded in high-density polyethylene and incorporates a unitary double-wall design, which provides a rigid surface with a cushioning layer of air between the walls for protection. It is padded with high-density foam to protect the computer system. All TravelMaster cases have luggage-style handles and locking latches. *(List Price: $82.50)*

Requires: Apple IIc

Southern Case, Inc.
TravelMaster Division
2315 Laurelbrook Street
P.O. Box 28147
Raleigh, NC 27611-8147
(919) 821-0877

CIRCLE READER SERVICE NO. **540**

MAC

▶ DAVONG MAC DISKS

Davong has added to its Mac Disk line of hard-disk drives for the Macintosh by introducing 21-, 32-, and 43-megabyte sizes, in addition to the original 10-megabyte Mac Disk. Average access times are 100 milliseconds for the 10- and 21-megabyte Mac Disks and 40 milliseconds for the 32- and 43-megabyte disks. Mac Disks now also include new Volume Manager software, a utility program that allows you to add, delete, and activate volumes easily. The program also gathers free space on the Mac Disk so that you can create additional volumes and enables you to connect Mac Disk to either the modem or the printer port of the Macintosh. *(List Price: 10-megabytes, $1950; 21 megabytes, $2795; 32 megabytes, $3395; 43 megabytes, $3995)*

Requires: Macintosh

Davong Systems, Inc.
217 Humboldt Court
Sunnyvale, CA 94089
(408) 734-4900

CIRCLE READER SERVICE NO. **541**

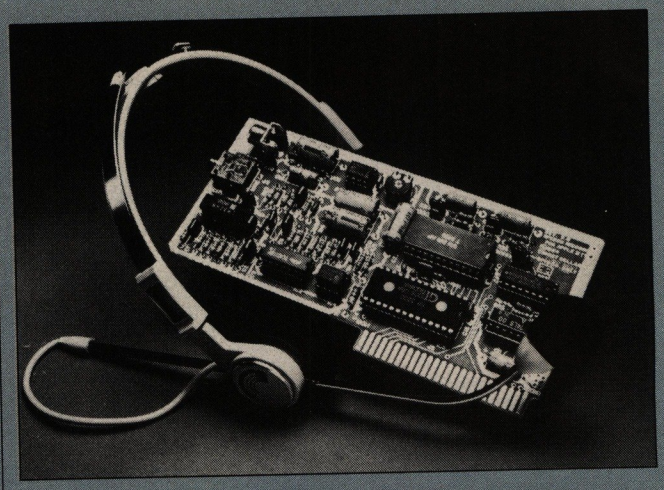
II SERIES LISA III MAC

▶ MODEM SPIKE PROTECTOR

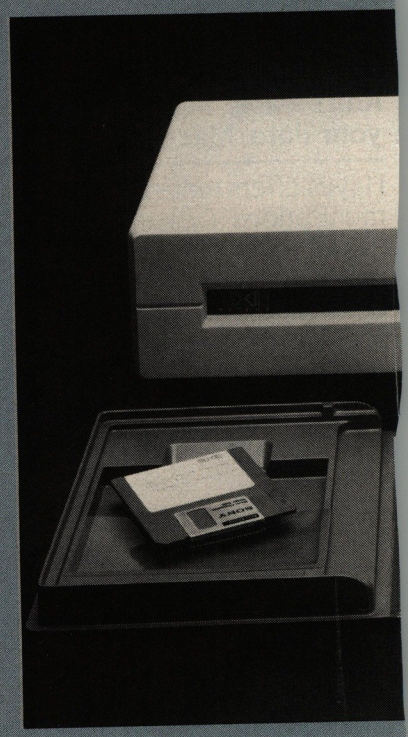
Indus-Tool's Modem Spike Protector is a simple plug-in device that you can attach to your modem to prevent transient spikes from distorting data that comes into your computer over phone lines. The device provides a peak transient protection of up to 12,000 volts and has a response time of less than 5 nanoseconds. It can also handle an energy of 70 joules and provides a series resistance of 25 ohms on each line. *(List Price: two outlets, $54.95; four outlets, $79.95; eight outlets, $97.95)*

Indus-Tool
325 West Huron
Chicago, IL 60610
(312) 642-6871

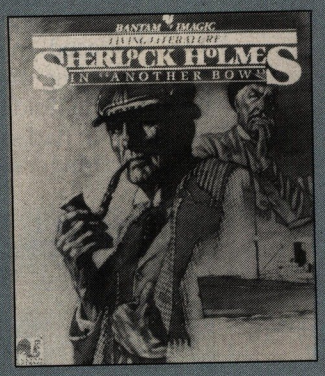
CIRCLE READER SERVICE NO. **542**



Lis'ner 1000, a voice-recognition and voice-synthesizer board from Micromint

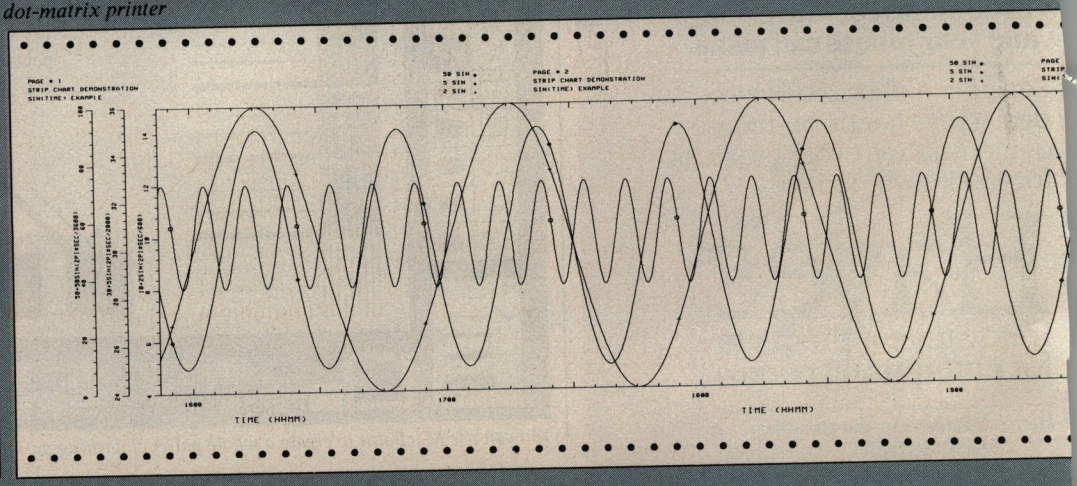


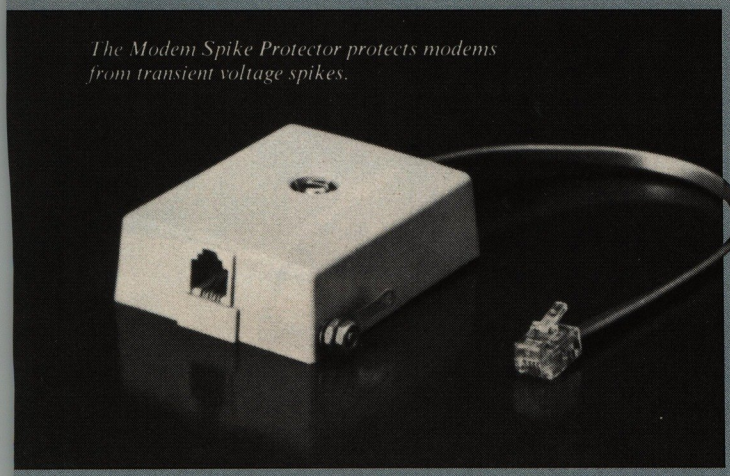
Davong has expanded its Mac Disk line to include 21-, 32-, and 43-megabyte sizes.



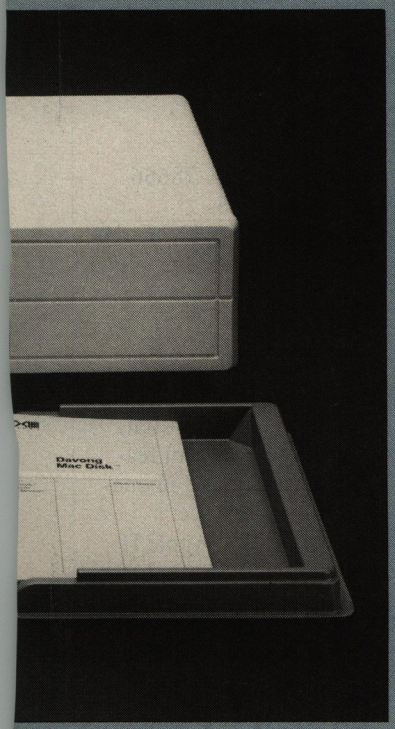
Sherlock Holmes in "Another Bow," an interactive-fiction program in Bantam/Imagic's Living Literature series

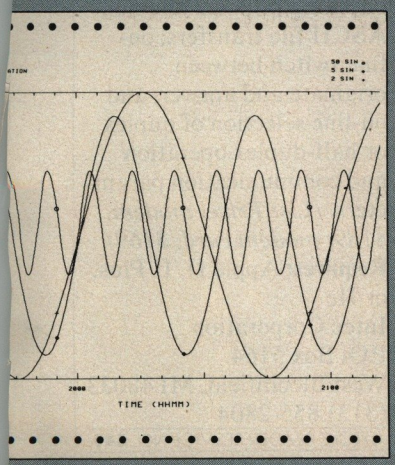
Dotplot allows you to use a dot-matrix printer





The Modem Spike Protector protects modems from transient voltage spikes.





VOICE-RECOGNITION

Micromint's Lis'ner 1000, which contains the SP1000 voice-recognition chip from General Instruments, is both a voice-recognition and a voice-synthesizer board. The system functions as a voice-entry device that is parallel to the keyboard so that you can speak DOS or keyboard commands or numbers instead of entering them from the keyboard. It also offers LPC (linear predictive coding) speech output from a precoded word dictionary and accommodates an optional SSI 263 phonetic speech-synthesizer chip with a text-to-speech algorithm. *(List Price: $189; with SSI 263 chip, $259)*
Requires: Apple II, II Plus, or IIe
Micromint, Inc.
25 Terrace Drive
Vernon, CT
(800) 635-3355
in CT (203) 871-6170
CIRCLE READER SERVICE NO. **543**

DOTPLOT, FROM CMI-CASCADE

The initial release under the PanSoft trade name from CMI-Cascade, Dotplot is a machine-language extension to Applesoft BASIC. The software enables you to use many types of dot-matrix printers for plotting with a resolution of 72 dots per inch vertically by 160 dots per inch horizontally. Programs include two that enable you to plot x,y data, either as line plots or bar graphs. Menu screens enable you to select and enter linear or logarithmic axes and limits and labels for axes. A third program produces accurately scaled drawings from text files of drafting commands, although you must use a word processor to create and edit drafting-command files. *(List Price: $65)*
Requires: Apple II Plus, IIe, or IIc; 48K RAM; one disk drive; dot-matrix printer with reverse line feed
CMI-Cascade, Inc.
P.O. Box 510
Philomath, OR 97370
(503) 929-2590
CIRCLE READER SERVICE NO. **544**

TravelMaster's TCI 2375 carrying case for the Apple IIc

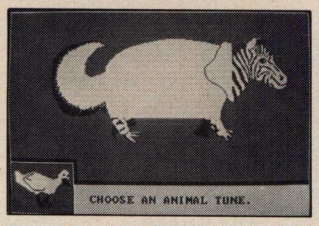
BANTAM SOFTWARE LINE

Bantam Electronic Publishing, a division of Bantam Books, is issuing its first line of home-computer software. Available now are seven titles that belong to three separate series: Selfware, a line of self-improvement software for adults; Microworkshop Series, learning games for children; and Living Literature, interactive fiction for all ages.

The first two titles in the Selfware series are The Complete Scarsdale Medical Diet and Know Your Own I.Q./Know Your Own Personality. Three programs are available in the Microworkshop Series: Fantastic Animals, three learning games that allow children aged 4–9 to create real and imaginary animals and match them to their environments; Creative Contraptions, games that

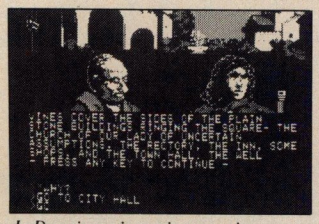
encourage children ages 7 and up to create Rube Goldberg-style machines; and Road Rally U.S.A., a driving game designed for children ages 10 and over that helps teach geography and map-reading skills, as well as problem solving and strategy.

I, Damiano: The Wizard of Partestrada and Sherlock Holmes in "Another Bow" are the first two titles in the Living Literature series,



Fantastic Animals, a learning program for children ages 4–9

published jointly with Imagic. I, Damiano is based on R.A. MacAvoy's science-fiction and fantasy trilogy; players assume the role of the 14th-century wizard Damiano. In the second program, players become Sherlock Holmes and attempt to solve a mystery.



I, Damiano is an interactive-fiction program based on R.A. MacAvoy's trilogy.

(List Price: $39.95 each)
Requires: Apple II, II Plus, IIe, or IIc; 48K RAM; one disk drive
Bantam Electronic Publishing
Bantam Books, Inc.
666 Fifth Avenue
New York, NY 10103
(212) 765-6500
CIRCLE READER SERVICE NO. **545**

HARDWARE

II SERIES III LISA MAC

UNIVERSAL MASS-STORAGE SYSTEM

Computer Products International (CPI) has introduced a Universal Mass Storage System that gives the speed and performance of Winchester technology while allowing multiple users to share a common disk system.

The Mass Storage System comes standard in capacities from 10 to 368 megabytes, and each system supports the Omninet local-area network. It also supports up to seven different operating systems shared by up to 64 users.

Depending on the drive, a maximum of 306, 480, or 987 tracks are available, with 26 sectors per track and 512 bytes per sector, and up to eight read/write heads. A dynamic status display provides users with important drive-activity information.

An optional 21.5-megabyte removable-tape-cartridge backup system is also available with the system, as is an intelligent print/communications server that has two serial ports to handle multiple printing and communications tasks. *(List Price: 10 to 92-megabyte systems, $1995–$6695; TapeBackup-23, $1295; TapeCartridge, $59.95; Interface-Kit, $225; Multiplexer-4, $400; Print-Server-2, $1295)*
Requires: Apple II, III, Lisa, or Macintosh
Computer Products International, Inc.
740 South Hillview
Milpitas, CA 95035
(408) 945-0100
CIRCLE READER SERVICE NO. **546**

The Intec 300 auto-dial/auto-answer modem

II SERIES

SERIAL BOX ADAPTER

The Serial box is a serial-to-parallel adapter that enables owners of Apple IIc computers to use almost any parallel-interface printer with their computers. Installation of the adapter is easy, and it comes complete with enough cabling to allow a 5-foot distance between the computer and printer. *(List Price: $89.95)*
Requires: Apple IIc
PBI Software
1155B-H Chess Drive
Foster City, CA 94404
(800) 843-5722
in CA (800) 572-2746
CIRCLE READER SERVICE NO. **547**

MAC

COMPOSITE VIDEO ADAPTER

Designed for use with the Macintosh, the Mentauris Composite Video Adapter (C.V.A.) provides high-quality composite-video-signal output for large-screen audience presentations such as those used in education or business. The adapter unit snaps easily into place—installation requires no soldering or wiring. The package includes step-by-step instructions and voltage, waveform, and subminiature-pin-dedication information. *(List Price: $199.95)*
Requires: Macintosh, video monitor or projector
Mentaur Technologies
100 Mecey Lane
Suite 203
San Marcos, TX 78666
(512) 396-1565
CIRCLE READER SERVICE NO. **548**

II SERIES

INTEC 300 MODEM

The Intec 300 auto-dial/auto-answer modem features software and phone-computer interface connections for Apple II computers. Other features of the modem include data capture to memory buffer and direct to disk file; on-line display of capture buffer; XMODEM error-checking protocol and non-ASCII file transfers; on-line switch between originate and answer; and on-line selection of duplex or half-duplex operation and communication parameters. *(List Price: modem, $189; modem card, $169)*
Requires: Apple II, II Plus, or IIe
Intec Corporation
P.O. Box 5164
West Bloomfield, MI 48033
(313) 855-2804
CIRCLE READER SERVICE NO. **549**

EXTEND-IT, SUPER SERIAL IMAGER

Apricorn has introduced two new products for Apple II computers. Extend-It is a 64K memory module that clips directly onto Apple Computer's 1K 80-column text card to provide the Apple IIe computer with an additional 64K memory. Users who own a 1K card now need not discard it in favor of Apple Computer's Extended 80-Column Card in order to obtain a 128K memory for their IIe computer.

The second product, Super Serial Imager, is fully compatible with Apple Computer's Super Serial Card and enables users of any Apple II computer to transfer high-resolution images, including graphics, from the computer screen to any number of serial-interface printers. The product also enables Apple II computers to communicate with modems such as 300/1200-baud intelligent modems from Hayes, Novation, or Anchor Automation, without requiring special communication software—all communication software functions reside in the firmware. *(List Price: $129.95 each)*

Requires: Extend-It—Apple IIe; Super Serial Imager—Apple II, II Plus, or IIe

Apricorn
7050 Convoy Court
San Diego, CA 92111
(619) 569-9483

CIRCLE READER SERVICE NO. **550**

WRITE GUARD ACCESSORY

Write Guard enables users to write on both sides of a diskette and eliminates the need to cut holes in the disk. The unit plugs into the disk drive and fastens to the side of the drive with Velcro. A three-position locking switch provides full control over the write-protect status of the drive. Any diskette can be write-protected, regardless of whether the side notch is covered. *(List Price: $44.95)*

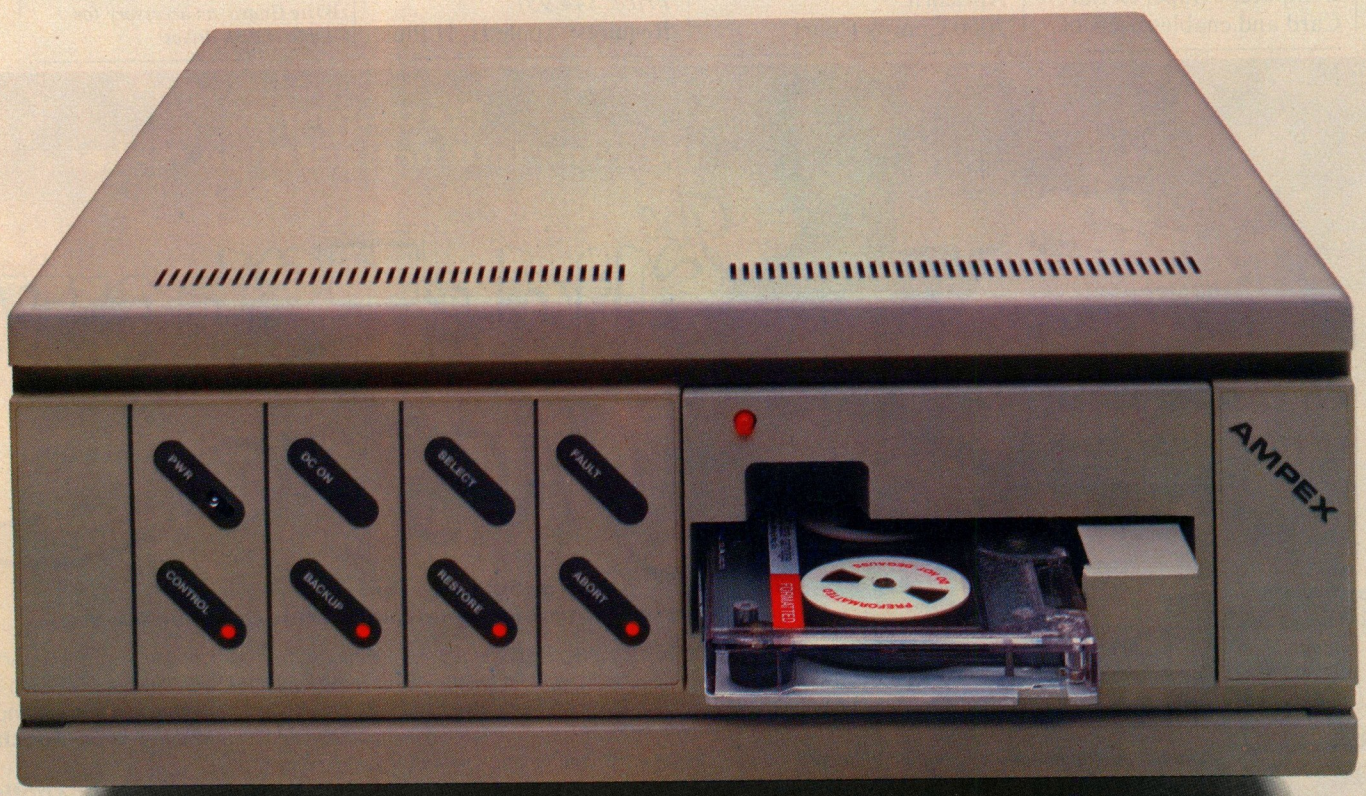
Requires: Apple II, II Plus, IIe, or IIc

Mark IV Designs
2315 South Canterbury Lane
Lincoln, NE 68512
(402) 423-0363

CIRCLE READER SERVICE NO. **551**

Write Guard, an accessory for Apple II disk drives

In the 92 seconds it find any file you need



Ampex 20 MB hard disk with 25 MB tape backup.

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takes to read this ad, on our backup streamer.

In the 1 hour, 4 minutes other streamers take, you could call your broker. Linger over coffee. Wade through the Wall Street Journal. And read this PC Megastore™ ad too. So take the time. You'll more than make it up with a PC Megastore hard disk and tape hooked to your IBM-PC* or compatible, Apple II or IIe,† because all the files you need–both current and archive–will always be right where you need them. Just a keystroke away. The secret? Only Ampex backs up a 20 MB hard disk with another 25 megabytes* of addressable storage–a unique, bootable streamer with cache memory. That not only means you can address a file in 92 seconds, you can backup files offline just by touching a couple of buttons. Without tying up your computer. Your time. Or a small fortune in floppies. (In fact, our 45 megabytes of available storage cost about half the price per MB of other hard disks.) So consider your time, money and convenience. And our quality. The PC Megastore system is backed by a full year warranty from Ampex, a company known for manufacturing quality computer peripherals for over 20 years. Take a moment. Contact: Ampex Computer Products Division, Marketing Communications, 10435 N. Tantau Ave., Cupertino, CA 95014. 800 421-6863, 213 640-0150 in CA. We'll give you a dealer's name so you can buy a PC Megastore system. Then in no time at all, you'll make up for the 92 seconds you spent reading this ad.

AMPEX

Ampex Corporation • One of The Signal Companies

*PC Megastore is upgradeable and comes in four models: 20 MB with 25 MB tape, 10 or 20 MB disk, or 25 MB tape.

CIRCLE 170 ON READER SERVICE CARD

MAC

▶ WINTERHALTER'S DATATALKER/MAC

The DataTalker/Mac is an intelligent data-communications processor that allows the Macintosh to emulate IBM 3270 interactive-terminal systems. The system connects to the Macintosh's modem port and connects to the mainframe with either a modem, modem eliminator, or limited-distance modem. The 3270 emulation program comes on a disk that you download from the Macintosh to DataTalker/Mac. *(List Price: $1095)*

Requires: Macintosh

Winterhalter, Inc.
3853 Research Park Drive
P.O. Box 2180
Ann Arbor, MI 48106
(800) 321-7785
in MI (313) 662-2002

CIRCLE READER SERVICE NO. **552**

II SERIES III

▶ TEKNIKA MONITORS AND TV PRODUCTS

Teknika Electronics, a company formed by Japan's General Corporation and C. Itoh to distribute their products in the U.S., has released several new color-display monitors, TVs, and accessories.

The tilt-stand MJ-22 is a high-resolution, 13-inch, 16-color monitor that can switch between RGB and NTSC composite video. It displays 2000 characters on an 80-column by 25-line screen with a resolution of 506×240 pixels. RGB operates at a bandwidth of 18 MHz and composite video at 3 MHz. The MJ-22 is compatible with Apple II and III computers; an optional MA-RGB7 RGB board that provides additional medium- and high-resolution modes and a choice of amber, green, blue, or white text characters is also available for the Apple IIe. *(List Price: MJ-22, $499.95; MA-RGB7 board, $199.95)*

Requires: Apple II, II Plus, IIe, IIc, or III

Teknika Electronics
353 Route 46 West
Fairfield, NJ 07006
(201) 575-0380

CIRCLE READER SERVICE NO. **553**

II SERIES

▶ CFD-501A FLOPPY-DISK DRIVE

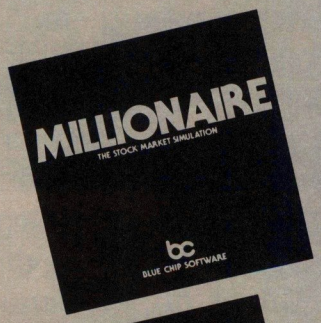
Video Logic Corporation has introduced the model CFD-501A half-height, 5¼-inch, floppy-disk drive. The CFD-501A is equipped with a direct-drive system for trouble-free operation, and it comes complete with power-indicator light, disk-lock level, and cable. The drive has a storage capacity of 143K and has 35 tracks. *(List Price: $129.95)*

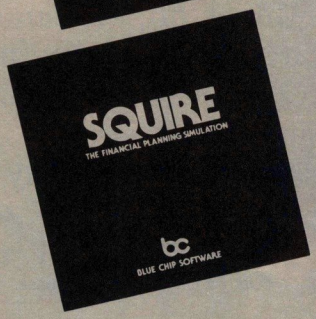
Requires: Apple II, II Plus, or IIe

Video Logic Corporation
597 North Mathilda Avenue
Sunnyvale, CA 94086
(408) 245-8622

CIRCLE READER SERVICE NO. **554**

IF WE KNEW THE ANSWER, IT WOULDN'T BE A PROBLEM.





Blue Chip Software is very good. Teachers, investment counselors, and game players agree. This software teaches a lot about personal investment. It teaches so much about personal investment, its even used in high schools and universities. But this software is fun too. Its so much fun that it has appeared on every major national software best seller chart as a game.

So, what's the problem?
The problem is what do we call a product that is both so educational and so entertaining for so many different types of people. Some people insist on calling it entertainment, others insist on calling it education, and still others insist on calling it a tool.

So, what's the answer?
We don't know. We do know that we are having no problem producing the best software for aspiring minds.

MILLIONAIRE, The Stock Market Simulation,™
TYCOON, The Commodity Market Simulation,™
SQUIRE, The Financial Planning Simulation,™
and **BARON**, The Real Estate Simulation.™
Available wherever software is sold.

bc
BLUE CHIP SOFTWARE™

Blue Chip Software Inc.
6740 Eton Avenue
Canoga Park, CA 91303
(818) 346-0730

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MOCKINGBOARD IIc
With Speech & Sound 169.99

QUADVUE NEW!
Monochrome Card 259.99

HARDWARE

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Ap	Parallel Interface w/Cable	39.99
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Ap	EXTENDED 80 Col. Card-IIe	129.99
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Ap	ORANGE MICRO Grappler +	114.99
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Ap	THUNDERCLOCK	109.99
Ap	TITAN Accelerator IIe	259.99
Ap	Neptune 64K	199.99
IBM	AST Six Pack Plus 64K	279.99
IBM	KENSINGTON PC Saver	29.99
IBM	QUADRAM 512+ 64K	229.99
IBM	Microfazer 8K-All Config.	149.99
IBM	Quadboard I or II-No K	219.99
IBM	TEAC ½ Height Drive #55B	159.99

EDUCATIONAL

DLM

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LEARNING COMPANY

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Ap/IBM	Reader Rabbit	27.99
Ap/IBM	Word Spinner	24.99

PEACHTREE

Ap	Algebra I-IV	ea29.99
Ap	Algebra V & VI	ea34.99

SPINNAKER

Ap	Grandmas House	24.99
Ap	Kids On Keys	19.99
Ap	Kidwriter	24.99
Ap	Rhymes & Riddles	19.99
Ap	Sum Ducks	24.99
Ap	Trains	27.99
Ap/IBM	Alphabet Zoo	19.99
Ap/IBM	Delta Drawing	34.99
Ap/IBM	Facemaker/Fraction Fever	ea24.99
Ap/IBM	Diddle Diddle/Kindercomp	ea19.99
Ap/IBM	Presidents Choice	27.99
Ap/IBM	Snooper Troops I or II	ea31.99
Ap/IBM	Story Machine	24.99

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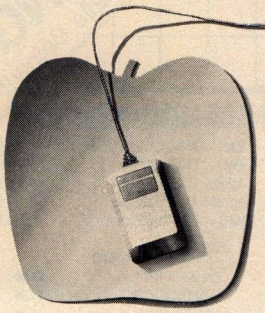

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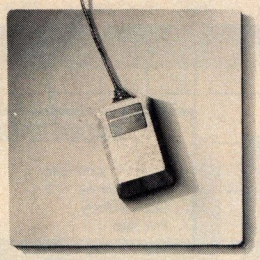

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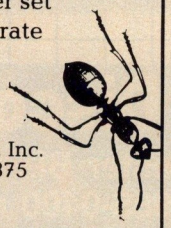

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CIRCLE 168 ON READER SERVICE CARD

HARDWARE ACCESSORIES

THE BETTER MOUSETRAP

The Better Mousetrap is an accessory for Apple computers that attaches to the side of the computer and holds a mouse. *(List Price: $9.95)*

PERK Company
150 Commercial Street
Sunnyvale, CA 94086
(408) 735-1807

CIRCLE READER SERVICE NO. **555**

The Better Mousetrap

MICRO DISKFILER FOR THE MAC

Computer Accessories Corporation has introduced a desktop disk holder, Micro DiskFiler, which is designed to complement the Macintosh computer. The holder measures 8.7 × 4.2 × 5.6 inches and can store up to 30 3½-inch disks. Six dividers allow you to organize your disks, which are visible through the holder's tinted, transparent lid. *(List Price: $19.95)*

Requires: Macintosh

Computer Accessories Corporation
7696 Formula Place
San Diego, CA 92121
(619) 695-3773

CIRCLE READER SERVICE NO. **556**

WICO COMPUTER COMMAND

Computer Command is a line of commercial-quality game controls and hardware accessories that use the same technology as Wico's arcade models.

The Model 50-0120 expander port offers four automatically selected game ports, two of which you can use simultaneously for two-player games. Users can change controllers during play without switching. The expander port uses either 16-pin DIP or 9-pin analog joysticks or other plug-compatible controls.

The Model 50-0108 is a grip-handle joystick that has gate-lock controls for four-way or eight-way directional control.

An Apple analog joystick, the Model 50-1030 also has two independent fire buttons, one on the base and one on the top. It has dual heavy-duty potentiometers, offers 360-degree movement, and has self-center and non-self-center options. The joystick comes with a 5-foot cord.

Finally, the Model 72-4525 is a dual-digital adapter for Apple computers. It features two 9-pin female input plugs mounted on an interface diode board and to which you can connect two digital joysticks simultaneously. *(List Price: Models 50-0120, 50-1030, $49.95; Model 50-0108, $31.95; Model 72-4525, $24.95)*

Requires: Apple II, II Plus, or IIe

Wico Corporation
6400 West Gross Point Rd.
Niles, IL 60648
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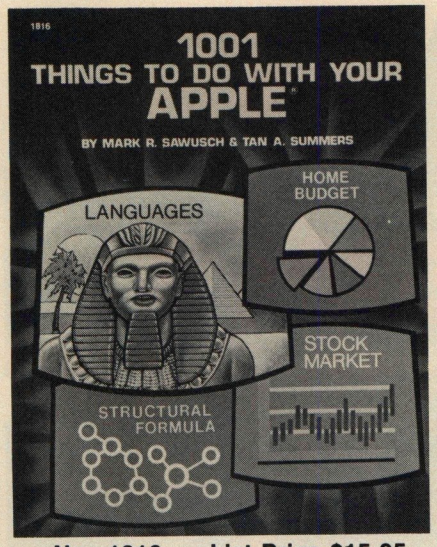

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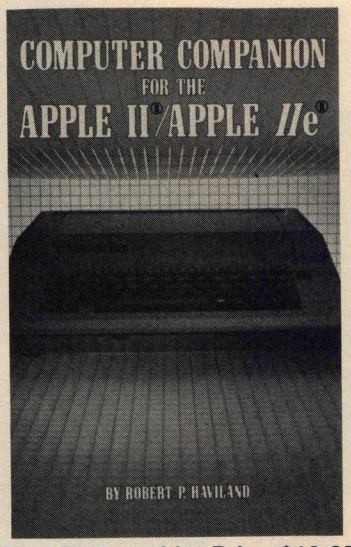

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Now available for Apple IIc

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This expanded version of Softerm lets you gain access to the information stored in your company's main computer from your home or office. With either version of Softerm, you can down load information into your Apple and capture it on your own disk in any format you choose—DOS, CP/M®, or Pascal. Also included with Softerm is a source program for your host computer to ensure compatibility with Softerm's file transfer capabilities.

Makes your Apple work exactly like any major terminal.
Softerm 2 provides complete emulation of these terminals: ADDS Regent 20, 25, 40, 60; ADDS Viewpoint; Data General D200; Datapoint 3601; DEC VT102, VT52; Hazeltine 1400, 1410, 1500, 1520; Hewlett-Packard 2622A; Honeywell VIP7205; VIP7801, VIP7803; IBM 3101 Model 10 and 20; Lear Siegler ADM-3A, ADM-5 and TeleVideo 910, 925, 950. And the list is growing all the time. We'll send you a User's Guide, handy reference card, and a telephone number to call if you need more assistance.

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3639 New Getwell Road, Suite 10
Memphis, TN 38118. (901) 683-6850

CIRCLE 164 ON READER SERVICE CARD

▶HARDWARE/ SOFTWARE

SERIES

▶SAVE-IT! UTILITY PROGRAM

Texprint, Inc., has introduced SAVE-IT!, a system-utility program that creates and presents slide shows on the Apple II series. Users can mix any screen—color, black and white, text or graphics, or the new high-resolution modes recently introduced by Apple—and then display the saved images either automatically or manually in any sequence. *(List Price: $29.95)*

Requires: Apple II, II Plus, or IIe

Texprint, Inc.
220 Reservoir Street
Needham Heights, MA 02104
(617) 449-5808

CIRCLE READER SERVICE NO. **558**

SERIES

▶VOICE MASTER AND SOUND MASTER

Covox has introduced two related products: Voice Master, which combines a speech synthesizer, a voice-recognition system, and a music machine; and Sound Master, a plug-in board that enables you to create music, speech, and sound effects.

Voice Master's speech synthesizer speaks in your voice. The system can store up to 64 different sounds and can store vocabularies and load them from disk. The system comes with Voice Harp software so that you can produce multipart harmony when you hum or whistle into the microphone.

To use Voice Master, you must also purchase Sound Master. This product produces three independently programmable tones that cover nine octaves, although you can add a second board to double the number of available tones. The board carries an on-board amplifier that can drive either an internal or external loudspeaker. Sound Master also lets you reproduce prerecorded synthetic or digitized speech. *(List Price: Voice Master, $119.95; Sound Master, $39.95)*

Requires: Apple II, II Plus, or IIe

Covox, Inc.
675-D Conger Street
Eugene, OR 97402
(503) 342-1271

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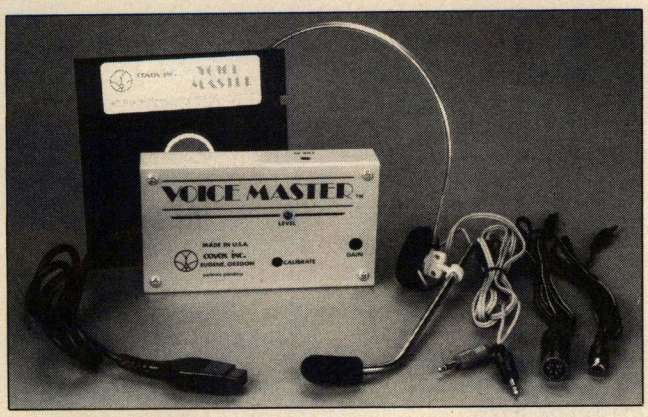

Voice Master combines a speech synthesizer, voice-recognition system, and Voice Harp music-making software in one product.

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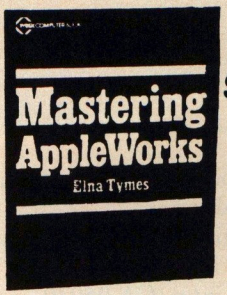

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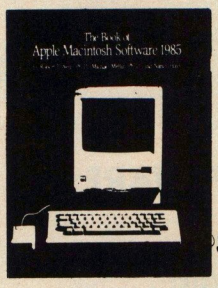
Sybex 250 pp. © 1984

If you've purchased Appleworks for your IIe or IIc you simply **must** have a copy of **Mastering Appleworks** by Elna Tymes. Abundant examples and applications will help you learn how to use the different functions of this package to solve practical business problems. No experience with computers is assumed by the author. This is the best book available on Appleworks.



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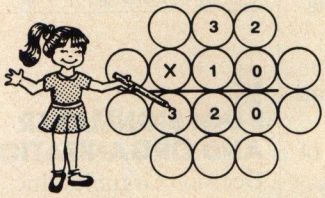

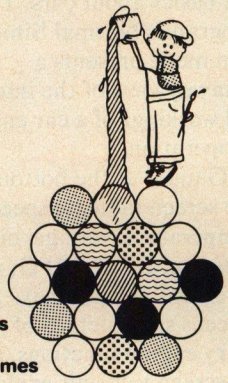

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SOFTWARE

IMAGIC SIMULATION

Imagic has released two simulation programs—Crime and Punishment, the first in its Fun with Experts series, and Injured Engine, a program in the company's Educational Simulations series.

Crime and Punishment provides players with an opportunity to learn about the workings of the criminal-justice system and the feelings of friends and family about the topics of crime and punishment. In the simulation, Crime and Punishment players act as presiding judge at criminal trials, reviewing details of crimes, examining evidence and testimony, analyzing defendants' records, and requesting assistance to determine proper sentences for a variety of crimes.

Injured Engine teaches the basics about cars. The program's Normal Simulation mode presents a cutaway view of the internal workings of a car engine in operation.

Gauges at the bottom of the screen indicate speed, temperature, voltage, oil pressure, RPM, MPG, and emissions. Additional screens show details of primary engine functions, and on-screen tutorials explain how each part and system works and how they interrelate. In the Troubleshooter Challenge mode, a repair-shop screen allows users to inspect an engine that is not functioning properly and test and replace parts as necessary. *(List Price: $34.95 each)*

Requires: Apple II, II Plus, IIe, or IIc; 48K RAM; one disk drive

Imagic
981 University Avenue
Los Gatos, CA 95030
(408) 399-2200

CIRCLE READER SERVICE NO. **560**

MACLABELER PACKAGE

MacLabeler lets you organize your Macintosh software library. The program reads the document, application, and folder names on your disks and then prints them on a wraparound label. The program can also display, sort, and print a complete directory of a disk. The package includes a starter pack of pressure-sensitive label material, although you can use any label material you wish. *(List Price: $49.95)*

Requires: Macintosh, 128K RAM, Imagewriter printer

Ideaform, Inc.
P.O. Box 1540
Fairfield, IA 52556
(515) 472-7256

CIRCLE READER SERVICE NO. **561**

DGI SIGNMAKER AND ORGANIZATION

Decision Graphics, Inc. (DGI) has released two menu-driven programs designed to work with Hewlett-Packard 7470A and 7457A plotters.

You can use The DGI Signmaker to create and edit text slides and signs. Plotter options enable you to use automatic or manual letter sizing, starting location, or page-size selection; to plot on either transparencies or paper; and to select pens without changing them manually.

The DGI Organization allows you to create organization charts for up to 50 individuals and save them to disk. You can also update previously created charts by adding or deleting individuals, and by changing text, titles, or footnotes of charts. *(List Price: The DGI Signmaker, $75; The DGI Organization, $175)*

Requires: Apple II Plus or IIe, 48K RAM, one disk drive, Apple Super Serial card, HP 7470A or 7475A plotter with RS-232C interface

Decision Graphics, Inc.
P.O. Box 2776
Littleton, CO 80161
(303) 796-0341

CIRCLE READER SERVICE NO. **562**

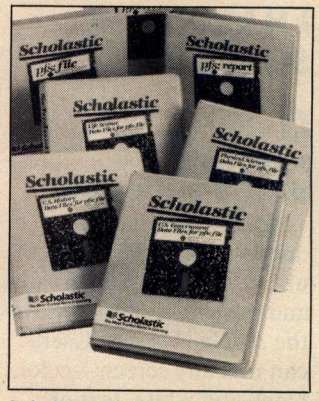
EDUCALC SPREADSHEET

EduCalc is a self-instructional spreadsheet program specifically designed for children ages 12 and older. Featuring easy-to-follow prompts and comprehensive menus, the program allows students to make "what if" calculations and teaches the basics of data manipulation and projection. Built-in tutorials explain spreadsheet concepts and vocabulary and teach children to use the software without constant reference to a manual. Templates that provide administrative applications and applications designed for specific curricular areas will be available later. *(List Price: $49.95)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive

Grolier Electronic Publishing, Inc.
95 Madison Avenue
New York, NY 10016
(212) 696-9750

CIRCLE READER SERVICE NO. **563**



Scholastic Software is publishing educational versions of PFS:Write, PFS:File, and PFS:Report, along with four curriculum databases for use with PFS:File and PFS:Report.

SCHOLASTIC SOFTWARE

Scholastic Software is now publishing educational versions of Software Publishing Corporation's PFS:Write, PFS:File, and PFS:Report. In addition, Scholastic is releasing four curriculum databases—History, Life Science, Physical Science, and U.S. Government—for use with PFS:File and PFS:Report. The Scholastic versions of the integrated PFS programs are designed to teach students database and computerized-reporting concepts within the context of a particular subject. Each package includes a program disk, an exercise-file disk, and a three-ring binder containing reference guides, learning activities, a teaching guide, and a keyboard card. *(List Price: $140 each; four databases, $125 each)*

Requires: Apple II Plus (PFS: File and PFS: Report only), IIe, or IIc

Scholastic, Inc.
730 Broadway
New York, NY 10003
(212) 505-3410

CIRCLE READER SERVICE NO. **564**

The word is out on word processors. Format-II® ranked number one.

We've always thought of Format-II as the finest, easiest to use word processor for Apple® II+, IIe and Apple IIc computers. We're pleased that Peelings II magazine agrees. They judged Format-II best out of 18 leading word processors. Here's why:

Format-II makes editing easy. There's our unique editing process: simple, mnemonic commands logically relate to the task you want to perform. To center text, you press [C]. To delete, [D]. To justify, [J].

And since what you see on the monitor is exactly what will print out, editing and formatting is always a breeze.

The Peelings II reviewer said, *"Format-II is one of the few word processors that is so comfortable and predictable, I would consider it as an addition to my small library of personal software."*

Peelings II Magazine Rating

FORMAT-II	1
SCREEN WRITER II™	2
PIE WRITER™	3
WRITE AWAY™	4
LETTER PERFECT 5™	5
WORDSTAR™	6
MEGAWRITER™	7
APPLE WRITER II™	8
PERFECT WRITER™	9
CORRESPONDENT™	10
SPELLBINDER™	11
MAGIC WINDOW II™	12
ZARDAX™	13
SUPERTEXT 40/80™	14
GUTENBERG™	15
WORD HANDLER™	16
SELECT™	17
SANDY™	18

Reviewed by John Martellaro, September 1983, based on Peelings II rating system for performance and performance to price ratio.

Format-II supports all printers. Unlike other word processors, Format-II is compatible with *every* printer that works with the Apple, from the simplest dot matrix printer to the most advanced letter quality printer.

A built in mailing list at no extra cost! Actually a database system resembling an index card file. A SORTING program will arrange the mailing list alphabetically or numerically. Powerful LOGIC commands merge specific entries into form letters and documents.

In the words of the Peelings II reviewer: *"This is the best program I have seen for people who do a lot of work with mailing lists, form letters and short correspondence."*

An easy to follow manual. Essential to any good program is a manual that's clear and understandable. The Peelings II reviewer describes the Format II manual. *"All in all, it is one of the best word processor manuals I have seen. The latest documentation is a model of clarity and organization."*

Put it all together. Then add features such as support of hard disk drives and a standard DOS text file format compatible with spellers and communications programs, and it's not hard to see why Format-II has earned the number one rating.

The words of the Peelings II reviewer sum it up: *"I cannot think of another word processor that would be better overall for business use."*

Thanks Peelings II. We couldn't have said it better ourselves.

For a reprint of the full review, or to order Format-II, contact: Kensington Microware, Ltd. 251 Park Avenue South, NYC, NY 10010, (212) 475-5200.

Format-II requires 64 K and an 80 column card.
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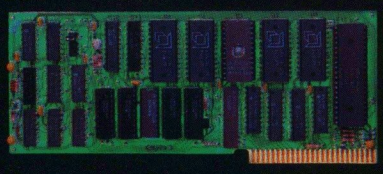

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CIRCLE 133 ON READER SERVICE CARD

THE STORE MANAGER

The Store Manager, an inventory-control and point-of-sale software package, is now available in a fast ProDOS version. The new version can work with the ProFile hard disk to handle more than 7000 inventory items and more than 7000 customers or vendors. The Store Manager produces invoices, purchase orders, receiving reports, expense vouchers, packing slips, and quotations and maintains up-to-date sales totals. *(List Price: $295)*

Requires: Apple IIe or IIc, ProDOS

High Technology Software Products, Inc.
P.O. Box 60406
Oklahoma City, OK 73146
(405) 524-4359

CIRCLE READER SERVICE NO. **570**

STICKYBEAR READING, MATH

Two new educational programs that feature the animated character Stickybear, hero of a series of software designed for preschool children, are now available. The new programs—Stickybear Reading and Stickybear Math—are intended for elementary-school children.

Stickybear Reading is a word- and sentence-comprehension program for children ages 5 to 8. It features three distinct activities: Match the Word presents word or picture sets to aid vocabulary building; Find the Word enables children to see words in a sentence come alive; and Build a Sentence teaches subjects, objects, and verbs.

Stickybear Math is an addition and subtraction aid for 6 to 9 year olds. The program has 20 levels of difficulty, and as many as 25 children can use it simultaneously. *(List Price: $39.95 each)*

Requires: Apple II, II Plus, or IIe

Weekly Reader Family Software
245 Long Hill Road
Middletown, CT 06457
(203) 347-7251

CIRCLE READER SERVICE NO. **571**

TEMPERATURE LAB FROM HAYDEN

Temperature Lab is the first offering in a new science-laboratory software series from Hayden Software. The program enables students to conduct experiments and features a temperature sensor that plugs into an interface module connected to the computer's game port. Using this sensor, students can record temperatures, display them on the screen, and compare them with readings taken with an alcohol bulb thermometer, which is also included in the package. The software also enables users to choose Fahrenheit or Celsius scales, compare them on the screen, vary the time of experiments, and display data in either graph or table form. A comprehensive *Experimenter's Guide* accompanies the program. *(List Price: $99.95)*

Requires: Apple II, II Plus, or IIe

Hayden Software Company, Inc.
600 Suffolk Street
Lowell, MA 01854
(617) 937-0200

CIRCLE READER SERVICE NO. **572**

inTOUCH

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Software Masters, 3330 Hillcroft, Suite BB, Houston, Texas 77057
(713) 266-5771.

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Memo to Apple® users

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METHOD:
Using the NEW SPACE COAST SYSTEMS PRODUCTS illustrated.

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- SCS Multiuser Disk Server for Apple II, IIe, and Apple III. Supports 8 Apples — 16 with additional channel card. Apple #A3M0109.
- SCS High Speed Tape Streamer Backup Module stores 42 MB on tape in 9½ minutes.

CONCLUSION:
Order through Apple dealer or get more information by enclosing business card with this memo and send to:

Space Coast Systems, Inc.
301 S. Washington Ave., P.O. Drawer 2767 AP
Titusville, FL 32781
305-268-0872 • Telex 701506

CIRCLE 135 ON READER SERVICE CARD

SERIES

▶ PROCESS QUALITY SIMULATOR

Designed for those such as production managers who have to make business and technical decisions about production processes, the Process Quality Simulator helps you evaluate the quality of parts produced by a manufacturing process. The program models your production process, generating units with the same variation and bias, and enables you to use "what if?" analyses to evaluate alternative actions. The program uses Monte Carlo random-number simulations, is easy to use, and comes with a step-by-step tutorial. *(List Price: $135)*

Requires: Apple II, II Plus, IIe, or IIc
Navone Engineering
2116 Waterloo Road
Stockton, CA 95205
(209) 941-2669
CIRCLE READER SERVICE NO. **573**

SERIES

▶ RECORD MASTER DATABASE

A full-featured, easy-to-use database program, Record Master performs all standard database functions—you can sort, search, view, print, update, and delete records. The program also has built-in features, such as report titles, page numbers, date and column headers, and various print fonts, that enable you to print reports easily. In addition, the program offers global change, arithmetic functions, computed fields, mailing labels, file restructuring, password protection, and more. *(List Price: $59.95)*

Requires: Apple II Plus, IIe, or IIc; 48K RAM; one disk drive
Bridget Software Company
1309 Canyon Road
Silver Spring, MD 20904
(301) 384-7875
CIRCLE READER SERVICE NO. **574**

SERIES

▶ LETTER WIZARD WORD PROCESSING

The word-processing program Letter Wizard, designed specifically for home use, has easy-to-use creating and editing functions that enable users to reorganize, insert, and delete text easily. Using the program's simple format feature, you can also print documents exactly as they appear on-screen.

A spelling checker checks the spelling of more the 33,000 words automatically, and you can also create an endless number of user-defined dictionaries. An available option is a database form-letter function that allows you to create personalized form letters. *(List Price: $74.95)*

Requires: Apple II, II Plus, or IIe
Datasoft, Inc.
19808 Nordhoff Place
Chatsworth, CA 91311
(800) 423-5916
in CA (818) 701-5161
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Ship ($10 overseas)	$02

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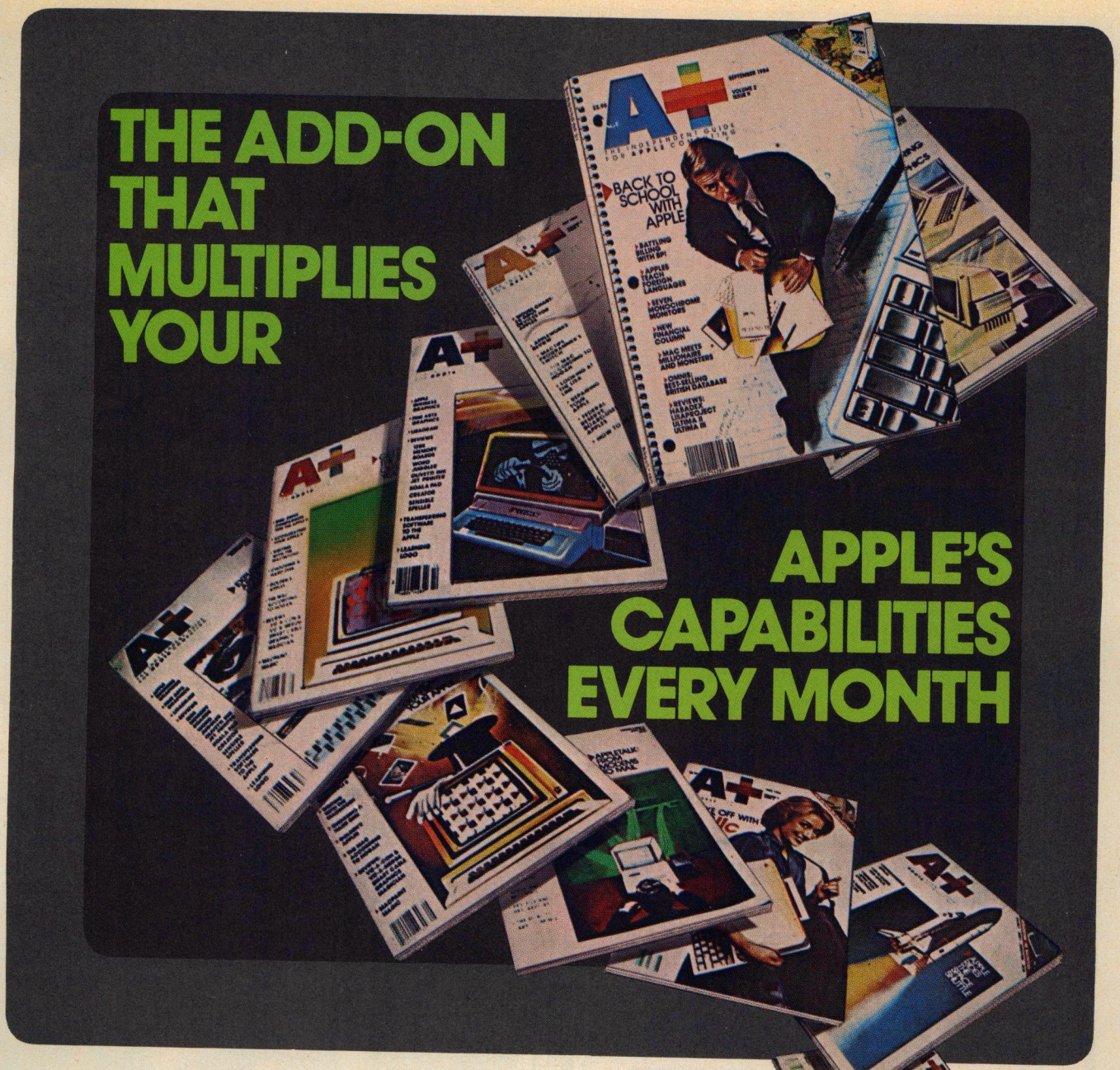

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SERIES

▶ SOLITAIRE SOFTWARE

Solitaire has released two new products—The Debit Credit Connection and The Ultimate Shopping Machine Plus Random Dining. The Debit Credit Connection is a fast and easy-to-use double-entry accounting program designed for personal or small-business use. The program can print checks, split transactions, post automatic transactions, and print automated reports. In addition, it uses high-resolution graphics and has on-screen prompts and a help line.

The second product combines two programs. The Ultimate Shopping Machine reminds you about your food and household needs and then prints a shopping list that lists items with their quantity and price. The list is organized in an order to suit the store where you shop. Random Dining not only stores your recipes but also references your cookbook by name and page. The program can also plan your menus by day, week, or month and can then print a list of all required ingredients. *(List Price: The Debit Credit Connection, $119.95; The Ultimate Shopping Machine Plus Random Dining, $50)*

Requires: Apple II, II Plus, or IIe; DOS 3.3; one disk drive

Solitaire
7146 West 113th Street
Bloomington, MN 55438
(800) 328-6795 Ext. 245

CIRCLE READER SERVICE NO. **576**

SERIES

▶ ACCOUNTMATE II

A complete, automated accounting package, the AccountMate II programs include General Ledger, Accounts Receivable/Billing Invoice, Accounts Payable, Sales Order, and Purchase Order. All programs are menu-driven, have on-line help and come with easy-to-read manuals. Extensive error checking and warning messages guard against clerical error, and a two-level password system prevents unauthorized access to data. The programs can accommodate ledgers for one to ten companies, and each company can have up to 99 departments. You can then consolidate department statements and budgets for an entire company or process them separately. *(List Price: $195–$395 per module; demo package, $25)*

Requires: Apple II, II Plus, or IIe; CP/M card; hard disk; dBASE 2.4

Softtech Information Systems, Inc.
20 Sunnyside Avenue
Mill Valley, CA 94941
(800) 762-7788
in CA (800) 228-8896

CIRCLE READER SERVICE NO. **577**

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***PCP*™ PRINTER CONTROL PROGRAM**

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EPSON PRINTER CONTROL PROGRAM

PRINTER OPTIONS

A	CONDENSED	G	6 LINES/INCH
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E	EMPHASIZED	K	UNIDIRECTIONAL
F	DOUBLE STRIKE	L	BIDIRECTIONAL

SOME COMBINATIONS

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N DOUBLEWIDE EMPHASIZED
O DOUBLEWIDE EMPHASIZED DOUBLESTRIKE
P CONDENSED DOUBLEWIDE
Q CONDENSED DOUBLEWIDE DOUBLESTRIKE
R CONDENSED DOUBLESTRIKE
S CONDENSED HALF SIZE
T RETURN TO STANDARD SETTINGS

TYPE LETTER, PRESS RETURN (0 ENDS)

VERSIONS:
Apple II, II+, IIe and III WITH
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Epson MX*, RX & FX Printers
C.Itoh Prowriter I & II
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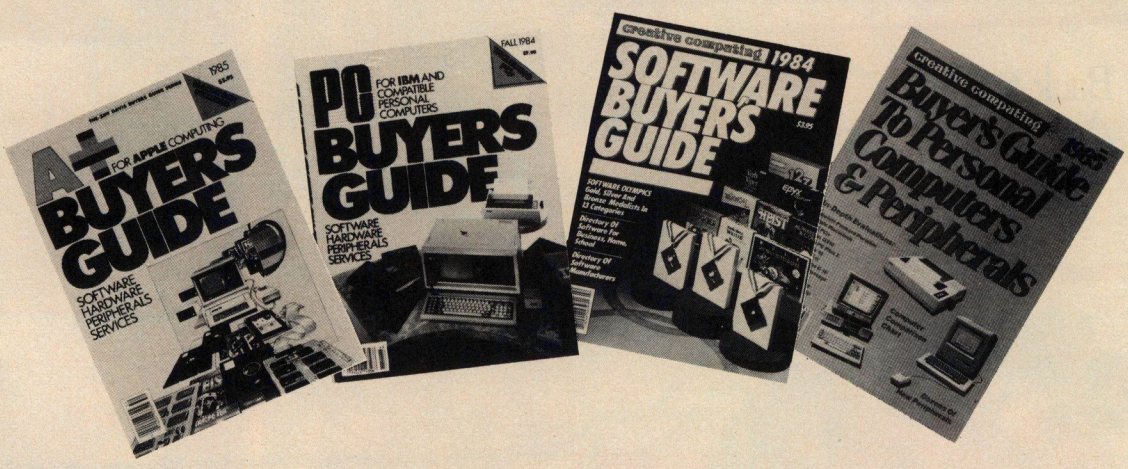

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SERIES

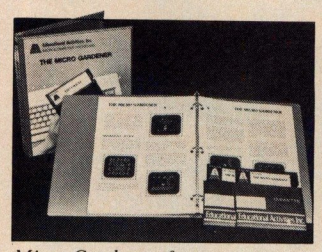
▶ EINSTEIN MEMORY TRAINER

Five lessons within this program lead users through proven techniques for remembering people's names, word or number lists, important dates, and phone numbers. Memory Mix, a game included in the software, helps users practice and apply what they have learned in the lessons. *(List Price: $39.95)*

Requires: Apple II Plus, IIe, or IIc

Avant-Garde Publishing Co.
P.O. Box 30160
Eugene, OR 97403
(503) 345-3043

CIRCLE READER SERVICE NO. **582**



Micro Gardener, from Educational Activities, Inc.

SERIES

▶ MICRO GARDENER SIMULATION

This high-resolution simulation program allows students to study up to 18 weeks of plant growth in 12 to 18 minutes. Three programs simulate the growth of a potted plant from seed. The student decides on a weekly basis how much water, sunlight, temperature, and heat to give the plant.

Animated graphics show the expected growth of the plant in relation to the care it's receiving. Successful horticulturists receive a first-place ribbon. *(List Price: $63)*

Requires: Apple II Plus, IIe, or IIc

Educational Activities, Inc.
P.O. Box 392
Freeport, NY 11520
(516) 223-4666

CIRCLE READER SERVICE NO. **583**

MAC

▶ THE DESKSET PROGRAM

The DeskSet, a desk-management program for the Macintosh, provides tools for organizing and planning personal and business activities. The program includes a notepad that has a filing system and full editing abilities, a desk directory and phone book, and a calendar and appointment book. The program also has a financial calculator that has several built-in functions, including rate of return, discounted cash flow, depreciation calculations, and amortization and interest problems. An Encryption feature provides password protection. *(List Price: $99.95)*

Requires: Macintosh

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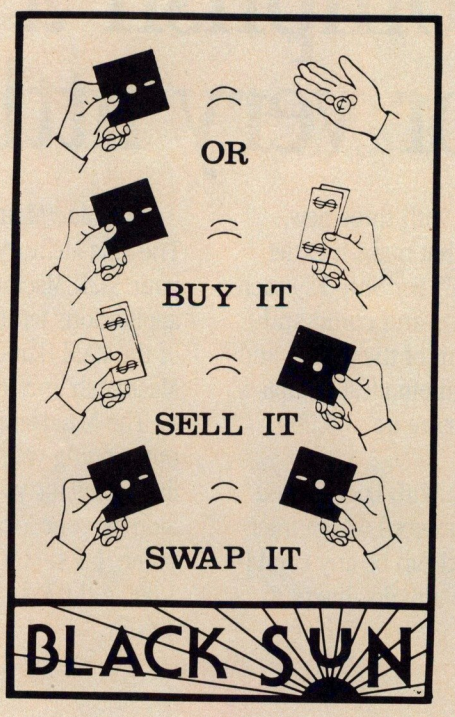

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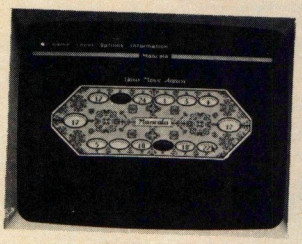

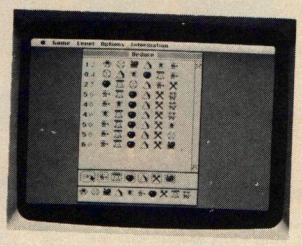

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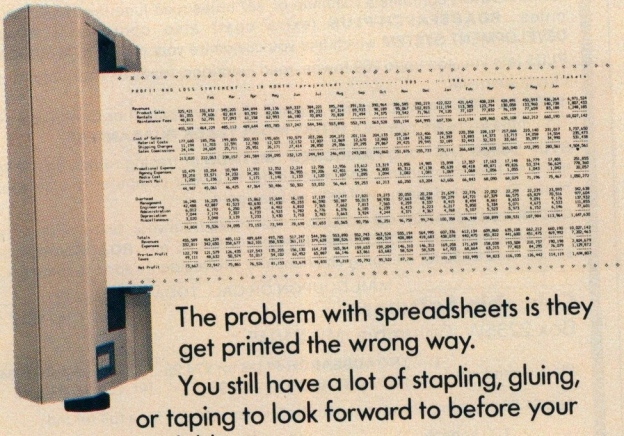

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CIRCLE 154 ON READER SERVICE CARD

SPEAKING OF GRAPHICS
BY ROBERTA SCHWARTZ AND MICHAEL CALLERY
Designing graphics for needlepoint projects, teaching programming to gifted kids, animation, and more

LETTERS, WE GET LETTERS

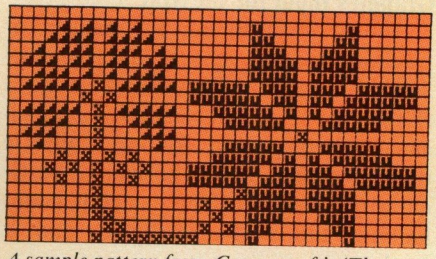
We're delighted that so many of you read and enjoy the column. We welcome your questions, and we're trying to answer all of you personally; please be patient. When questions might be of interest to others, we'll include them in the column.

Here Goes . . .

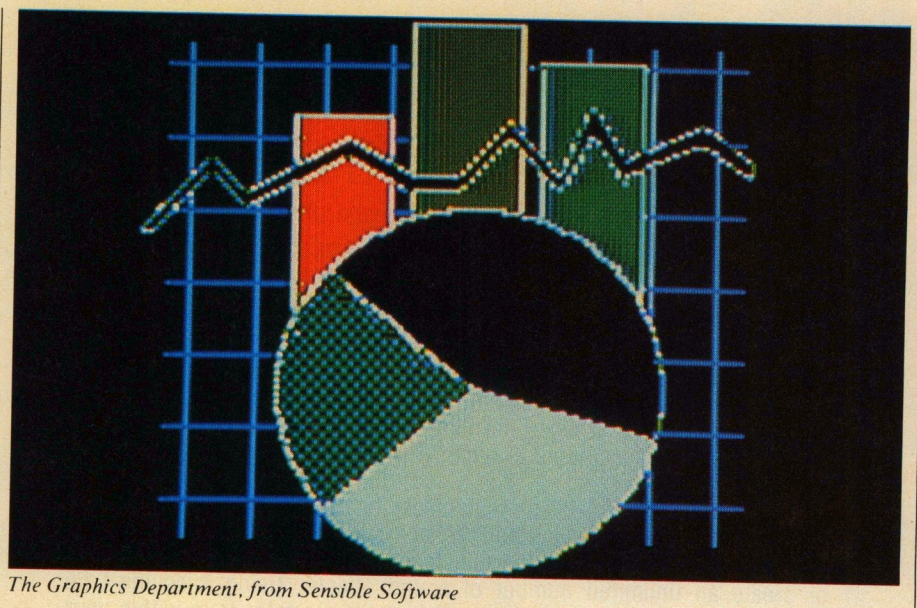
For Barbara, who spent two years in search of a program that would help her design graphics for needlepoint and cross-stitch projects—your search has ended. Check out The Stitch Grapher from Compucrafts.

For Donald, who's using graphics to teach computer programming to gifted children, we recommend an excellent book by Daniel Watts. It comes in two versions: *Learning with Logo* and *Learning with Apple Logo*. While we're on the subject of books, here are two that we find very helpful. *Apple II Computer Graphics*—by Williams, Kernaghan, and Kernaghan—covers the ins and outs of using hi-res graphics, including Applesoft shapes and shifted shapes for animation. Roy E. Myers' Microcomputer Graphics successfully clarifies graphics concepts.

Donald also expressed his frustration in trying to grasp the basic concepts of graphics and animation, even though he's been doing a lot of reading and experimenting. You can learn just so much on your own. It's helpful to take a course—at a local community college or other institution—in programming, computer graphics, or any other subject when you're exploring it. A teacher can answer questions and clarify some of the mysteries. You may also want to join a users' group, where you can exchange ideas with people who have similar interests.



A sample pattern from Compucraft's 'The Stitch Grapher'



The Graphics Department, from Sensible Software

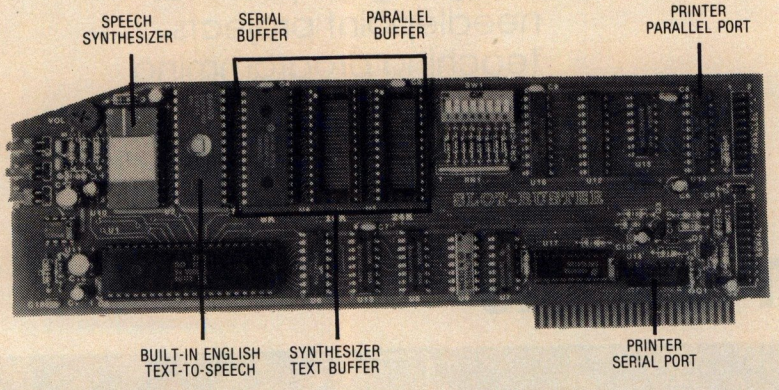
Ken sent a query about the sample screen display in our article "Seeing Double" (*A+*, December 1984, pages 98–101). After he typed HGR:POKE −16290,0 on his Apple IIe, Ken's display looked different from the one in our illustration. Coincidentally, when we got his letter, we were in the midst of verifying programs and illustrations for the final manuscript of our book. We discovered that the display on Roberta's IIc is different from the one on Michael's IIc, and both are different from the one Ken gets! Ken was concerned that this difference meant he couldn't use double-hi-res graphics. No problem. A little testing revealed that the only constant is the vertical black bars created by the HGR command in main memory. The contents of auxiliary memory appear to vary from computer to computer—we don't know why. In any case, the commercial programs take care of initializing and managing the auxiliary memory necessary for double hi-res graphics. If you want to do it yourself, you must work from assembly language and follow the guidelines in the manual for Apple's Extended 80-Column Card or the reference manual for the IIc.

By the way, Ken, the printout you sent us was helpful, but it wasn't an accurate picture of the double-hi-res screen. Many of the older printer-dump cards decode the first or second hi-res page, but they don't mix the main and auxiliary memory. If you want instant dumps of double-hi-res screens, look into the new generation of interface cards, such as Print-It and Serial Grappler. Before you discard older interfaces, check with the manufacturers to see if upgrades are available.

The Graphics Department

When we wrote the theme article on presentation graphics ("Presentations

If You've Got A Slot, We've Got The Card.



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Also included in the Slot-Buster is the most innovative and first really *useful* speech synthesizer that leaves all the others utterly speechless. It's so intelligent, in fact, that you can easily teach it to speak foreign languages, or create an unlimited number of sound effects. Using it couldn't be simpler either, because you access it just like a printer from within your programs. Even program listings can be directed to the synthesizer for verbal output. And another first. . . *The synthesizer's internal text-to-speech rules can be easily redefined for virtually any spoken language.* (We've even included Spanish text-to-speech rules on disk, free!) And with the built-in text buffer, there's never any waiting.

If you're worried that all of these advanced features will bog down your Apple, stop worrying. A fast and powerful on-board Z80-based computer oversees all of the Slot-Buster's functions, so your Apple doesn't have to. In fact, *the Slot-Buster doesn't even use any of your Apple's memory!* We think you'll also be pleasantly surprised with the Slot-Buster's price - it's only slightly higher than you'd expect to pay for a card with only one function.

The Slot-Buster is compatible with all popular printers including Apple's Imagewriter. All functions are compatible with AppleWorks, BASIC, PASCAL 1.1, and CP/M. Free disk software includes a hi-res printer dump program that supports both single and double hi-res graphics, a self-test diagnostic program, and more.

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CIRCLE 118 ON READER SERVICE CARD

with Personality," *A+*, February 1985, pages 26–33), we had a chance to explore many programs that we hadn't used before. One of these programs impressed us so much that we thought we should devote some space to it here.

The Graphics Department is an easy-to-use, well-documented business- and presentation-graphics utility. This package has everything you need to create dynamic presentations. The Chart Generator creates pie, bar, scatter, and line charts from data that you key in or from DIF (Data Interchange Format) files (files created with programs such as VisiCalc). You have a choice of 20 fonts for lettering your screens, and these fonts can be shadowed, colored, and so on.

You can learn just so much on your own. It's helpful to take a course— at a local community college or other institution.

With this program you can draw and paint in 100 colors. The program works with standard 8K hi-res pictures, so you can use it with graphics that you create with any standard Apple graphics program. A full range of editing options includes Cut and Paste, Overlay, Merge, Flip, Shrink, Invert, and more.

The Slide Projector module gives you control of up to 32 hi-res pictures for display on your CRT. You can subtitle and show these pictures at varying speeds in an interactive or self-running slide show.

Although we highly recommend this program for individuals as well as businesses, we must state our objection to the company's latest ad, which reads, "*Replace* that graphic 'artist' with a complete Graphics Department." (The italics are ours.) We suggest that you *reward* that graphic "artist" with a complete Graphics Department.

Graphics Input for the Mac

If you want to use the mouse for tracing images, check out MouseAround from FrontRunner. We have the prototype, which consists of a horseshoe-shaped plastic frame, a plastic drawing board, and a horizontal-vertical alignment bar. The device is good-looking and well-constructed, and it works.

For those who are having difficulty

manipulating the mouse, Summagraphics Corporation has announced the MacTablet, a 6 × 9 graphics tablet for the Mac. (Watch for a review in an upcoming issue of *A+*.)

Many digitizers are available for the Mac. We use Magic from New Image Technology, Inc. It is the most expensive one of the lot, but it gives users the most control. A future issue of *A+* will contain a comprehensive, comparative review of Mac digitizers.

Slide Show

We end this column with a program all Apple artists can use. It creates a self-running slide show of your hi-res pictures. The program uses a technique known as "page-flipping," so the viewer never sees the pictures load.

```
10 TEXT:HOME
20 L1=8192:L2=16384:LOC=L1
30 READ F$
40 IF F$="DONE" THEN GOTO 500
50 PRINT CHR$(4);"BLOAD";F$;",A";LOC
60 C=C+1:IF C<>1 THEN GOSUB 200
70 IF LOC=8192 THEN GOTO 100
80 POKE -16299,0:LOC=L1
90 GOTO 30
100 POKE -16300,0:LOC=L2
110 GOTO 30
200 POKE -16297,0
210 POKE -16302,0
220 POKE -16304,0
230 RETURN
500 END
1000 DATA mypic1.pic
1010 DATA mypic2.pic
1020 DATA continue your pic names
1900 DATA DONE
```

Put your picture names—standard 33/34-sector pictures—in the data statements, beginning at line 1000. Be sure to type the filenames exactly as they appear on the catalog. Don't change line 1900; the last name in the DATA list must be DONE.

The key to this program is in the use of a variable to represent where to load each picture. The variable LOC contains either 8192 (page 1) or 16384 (page 2). The IF statement in line 70 is responsible for flip-flopping the value of LOC. Line 50 loads a picture to the value stored in LOC. When the program is run, LOC is set to 8192, and the first picture is loaded to page 1. Line 60 contains a counter so that the necessary screen switches will be thrown to display hi-res graphics the first time the program is run. When the IF statement in line 70 is true, the program branches

kyan

PASCAL

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kyan pascal is the most complete package available for learning and using the Pascal language. And now, it's available for the Apple II family of computers.

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to line 100, which does the POKE to turn on page 1, changes LOC to 16384, and loops back to read the name of the next picture. When the IF statement is false, line 80 does the POKE to turn on page 2 and changes LOC to 8192. Then line 90 jumps back to the READ statement to find out which picture to load. The value of LOC, then, determines which page to load to and which screen to show. After all of your pictures are displayed, when F$ is DONE, the program ends.

If the pictures go too fast, add a delay loop at line 85 and 105; if the pictures go too slowly, use a commercial DOS speedup utility. You can modify this program to include a text or low-res title screen by using a subroutine at line 15; the text/low-res page will be on the screen until line 60 is executed.

Please write to us, c/o *A+* Magazine, 11 Davis Drive, Belmont, CA, 94002. ✚

▶ PRODUCT INFORMATION

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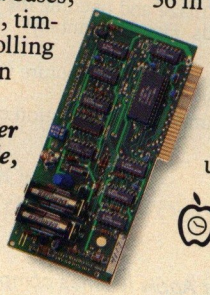
The people at Apple® should know a good peripheral when they see one. And when they developed ProDOS™ to upgrade the Apple II line, they made it automatically recognize and read Thunderclock.

Not surprising, when you consider Thunderclock's long list of useful applications. In the office, the lab and at home. It starts with time and date stamping disk files and just keeps growing. To automatically accessing data bases, sending electronic mail, timing experiments, controlling your sprinklers and even tracking satellites.

The fact is, the better you are with your Apple, the more useful Thunderclock becomes.



Thunderclock adds a new dimension to all the new ProDOS-based software (like APPLEWORKS™ and WORD JUGGLER IIe™). And gives you access to the time from years down to milliseconds. It comes with a one-year warranty and never misses a tick. On-board batteries keep it running for up to four years before you snap in a new pair.

So if you want to make ProDOS really produce, turn to page 36 in the *Basic Programming With ProDOS* manual. Then get yourself a Thunderclock. You'll see why somebody up there likes us.

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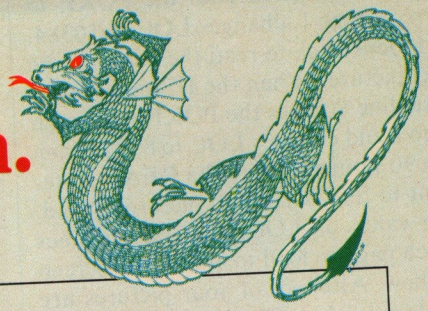
CIRCLE 226 ON READER SERVICE CARD

Big Game Hunting? Try Baggin' Our Dragon.



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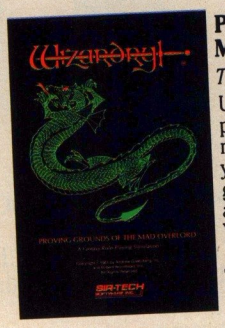

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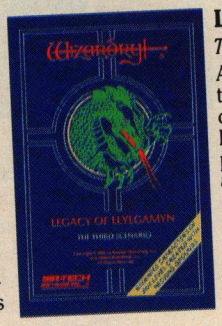

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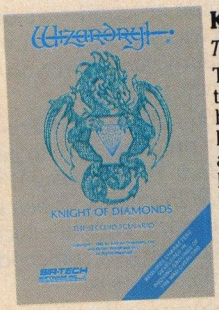

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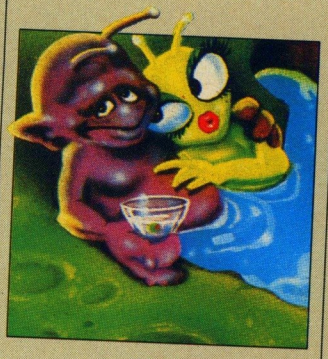


'You have destroyed most of a small galaxy. Please pick your words with greater care.'

A ZANY PLOT AND KNOTTY PROBLEMS

Awakening from an uncomfortable sleep, you soon perceive three facts: It's dark; you've got a particularly nasty hangover; and, unaccountably, a big yellow bulldozer is doing its best to demolish your house. Not long after you've pulled yourself together and gone outside, you happen to notice that a fleet of alien spaceships has swooped down from the sky, intent on pulverizing the earth.

Your morning is not turning out very well at all.

Despite these problems, you're not going to panic. You know who you are—for the time being, at least. It may be the end of the world, but you still have time for a bit of fun.

And fun you'll have, as you assume the role of Arthur Dent, the mild-mannered, often befuddled Englishman who is the hero of Infocom's latest science-fiction text adventure, The Hitchhiker's Guide to the Galaxy (HGG).

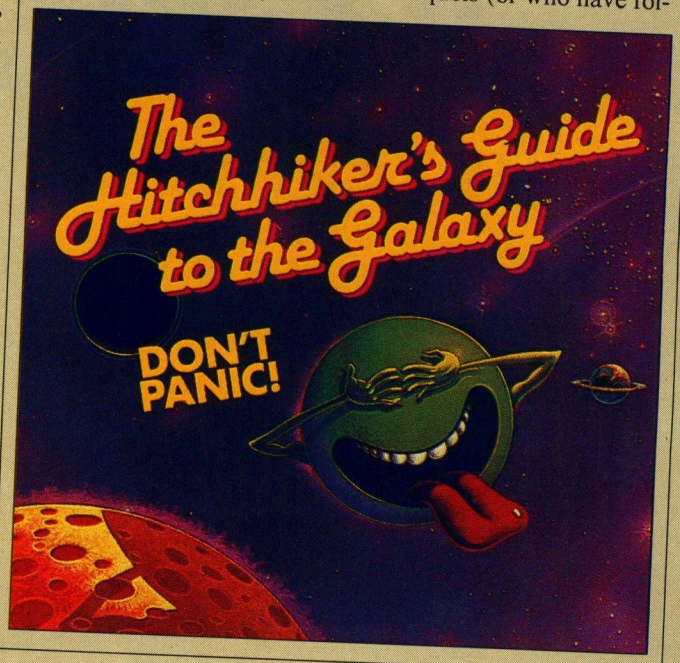
If you've enjoyed Infocom's previous games (Zork, Starcross, Deadline, et al.), you will love HGG. A "standard level" adventure (or "interactive fiction," as Infocom now calls all of its games), HGG does not present as many frustrating puzzles as the company's "advanced" or "expert" games do. It offers a zany and convoluted plot, however, and enough knotty problems to challenge even a veteran Infocom fan.

Novice players should expect to spend many hours getting through this game, and they will need a hint or two at certain critical points. (Can't stop the bulldozer? Try a little civil disobedience. Is the Babel fish too slippery? Make use of the junk you brought into space.)

Inspired Collaboration

HGG is the result of an inspired collaboration between Douglas Adams, the author of the best-selling novel of the same name, and Infocom's Steve Meretzky (Planetfall, Sorcerer). This game is Infocom's first attempt at adapting a story line from another medium, and the effort is a success. The game retains the look of a typical Infocom adventure—with its all-text format and trademark parser—as it incorporates the essence of Adams' witty, science-fiction spoof: "You have destroyed most of a small galaxy. Please pick your words with greater care."

Readers of the book will recognize similarities between events in the game and the intergalactic adventures of the fictional characters of Arthur, Ford, Trillian, Zaphod, and Marvin. In fact, players who have read the book and/or its sequels (or who have fol-



lowed the radio or TV series) will already comprehend the function of such mysterious objects as the Sub-Etha device; the Babel fish; the Infinite Improbability Drive; and, of course, the Guide itself. This foreknowledge doesn't spoil the game, though; there are lots of new plot twists, as well as plenty of opportunities for personality switches and space/time travel.

HGG's documentation is clearly written and colorfully illustrated, and the game's innovative book-like package is compact, attractive, and well organized, but you won't actually need to read the manual to play the game.

You must complete several tricky puzzles and a half dozen miniscenarios in order to finish HGG, yet the game provides only eight save-game positions. This player would have preferred more.

Like all other Infocom games, this one requires too much waiting before the program's clock lets you continue. Also, too much of the story deals with collecting unnecessary items. These drawbacks, however, are minor. The Hitchhiker's Guide to the Galaxy is well worth the fare.

Patricia Fitzgibbons

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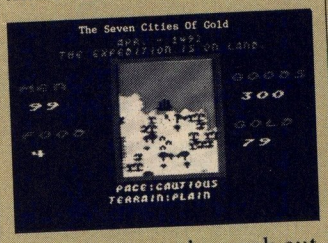
MORE THAN A GAME

Seven Cities of Gold, Electronic Arts' new game/simulation, recreates the age of the conquistador, with you in the shoes of the explorer of the New World. Your mission is to explore this



strange new realm, seek out new civilizations, and boldly go where no one has gone before.

The game presents the New World exactly as Columbus (and the others) found it—pristine, unspoiled, and unmapped. As you journey—by land or by sea—the world unfolds before you, with your computer cartographer keeping track of your discoveries. You and your men—with varying amounts of ships, food, trade goods, and (when you can find it) gold—can write your own ticket with the natives.

Have you always admired Attila the Hun? Go to it, then, pillage and plunder to your heart's content. Be aware, though, that the natives have good memories and a grapevine that carries news faster than you can travel.

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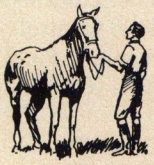

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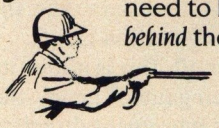

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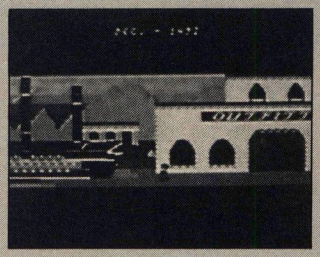
Electronic Arts, the graphics are well done. The map scrolls so smoothly you'll scarcely be aware that it's moving, and all terrain is instantly recognizable and pleasing to the eye. Sound effects are OK, but not great, consisting primarily of a marching sound when you're moving and a bugle when you discover noteworthy areas, such as vast plains, deep canyons, lush jungles, the mouth or source of a river, or the New World on your first voyage.

> As in most games from Electronic Arts, the graphics are well done.

Fortunately for those of us with parents, spouses, or offspring who sometimes prefer to enjoy the sound of silence while we explore, Control-S toggles the sound effects off and on. For a silent start-up, hold Control-S and (on an Apple II Plus) the Repeat key as you boot your disk.

Discover for Yourself

Seven Cities is one of those games that provides minimal documentation so that you can discover things for yourself as you play. I spent nearly 25 minutes puzzling over how to drop "excess baggage" before calling Electronic Arts for a hint. Other than that, the documentation is fine. After all, this is a joystick-driven game. The joystick gives movement direction and selects among menu options, and the button offers a new menu or selects the currently highlighted menu option for action. This game mechanism literally



allows you to kick back and enjoy the game. You need touch the keyboard only to freeze or restart the game; use the joystick for everything else.

My only criticism of the game is that you can save the game for later play only when the locale is Europe. In the early voyages, this limitation is OK, but with later voyages taking as much as two or three hours, it does restrict things a bit. The problem is that the game is so addicting that I didn't want to wait for a three-hour time slot to play. Considering the vast complexity and scope of the simulation, however, this inconvenience is bearable. If you were to make a wall map of the New World, at the scale shown on your game view screen, it would be 20 feet high and 12 feet wide. While you play, you see only a 3 × 3-inch square at a time, which really gives you an idea of the immensity of the area the early explorers faced.

All in all, Seven Cities is more than a game. The historical version lets young people discover for themselves the geography of the Western Hemisphere, as well as the various possibilities for social interaction with the natives. (Hint: If you want to be friendly,

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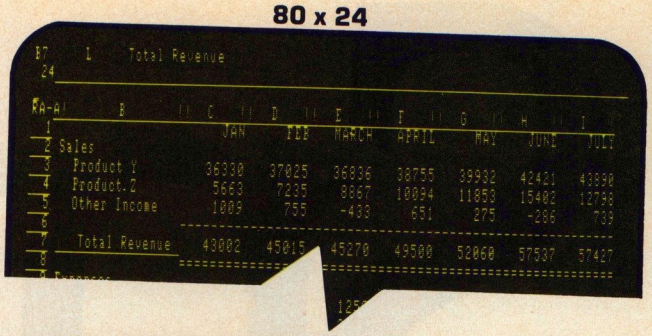

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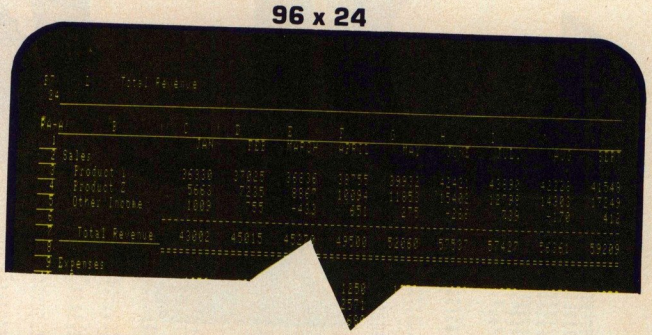

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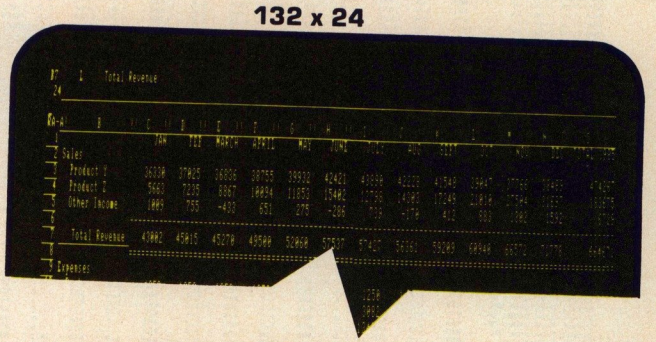

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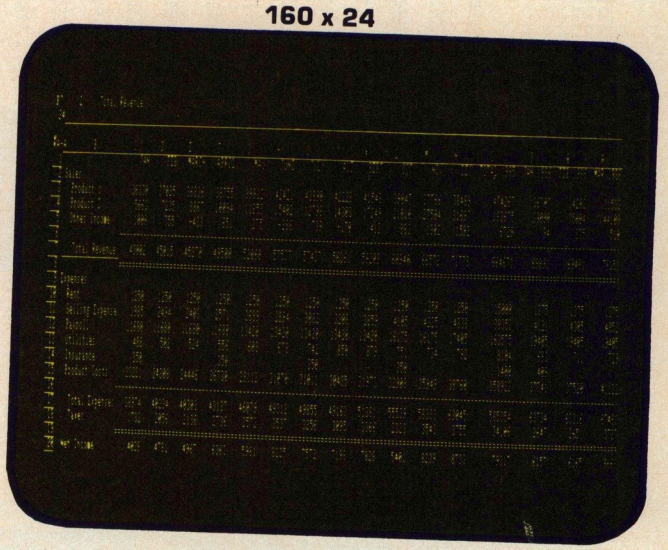

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Retail Prod Under 5K	40 1.1	42	[illegible]	[illegible]	49 1.1	52 1.1	54 1.1	57 1.3	60 1.1	63 1.1	66 1.1	69 1.5	643	73 1.1	76 1.1	80 1.1	84 1.9	
Direct Prod Under 1K	72 1.9	75	[illegible]	[illegible]	65 1.9	69 1.9	72 1.9	76 1.7	80 1.5	84 1.5	88 1.5	92 2.0	1,143	97 1.5	102 1.5	107 1.5	112 2.5	
Direct Prod Under 5K	54 1.5	57	[illegible]	[illegible]	82 1.8	86 1.8	90 1.8	95 2.1	99 1.8	104 1.8	110 1.8	115 2.6	1,072	121 1.8	127 1.8	133 1.8	140 3.1	
Direct Prod over 5K	67 1.8	71 1.8	74 1.8	78 1.7	86 1.8	90 1.8	94 2.0	99 2.0	104 2.3	109 2.0	114 2.0	120 2.8	1,172	132 2.0	139 2.0	146 2.0	153 3.4	
OEM Prod Under 1K	31 0.9	33 0.9	35 0.9	36 0.8	38 0.9	40 0.9	42 0.9	44 1.0	46 0.9	48 0.9	51 0.9	54 1.0	1,858	61 1.0	64 1.0	68 1.0	71 3.2	
OEM Prod Under 5K	74 2.0	77 2.0	81 2.0	85 1.9	89 2.0	94 2.0	99 2.0	104 2.3	109 2.0	114 2.0	120 2.0	126 2.8	972	132 2.0	139 2.0	146 2.0	153 3.2	
OEM Prod over 5K	117 3.2	123 3.2	129 3.2	135 3.0	142 3.2	149 3.2	156 3.2	164 3.1	172 3.2	181 3.2	190 3.2	200 4.4	1,142	129 1.9	135 1.9	142 1.9	149 3.3	
VAR Prod Under 1K	136 3.6	138 3.6	140 3.6	142 3.0	144 3.2	146 3.2	148 3.2	150 3.1	153 3.2	156 3.2	159 3.2	162 3.6	$58,735	6,627 100.0	6,958 100.0	7,306 100.0	7,671 170.6	
VAR Prod Under 5K	472 1.9	475 1.9	479 1.9	483 1.9	487 1.9	492 1.9	496 1.9	501 2.2	506 1.9	511 1.9	517 1.9	523 2.7						
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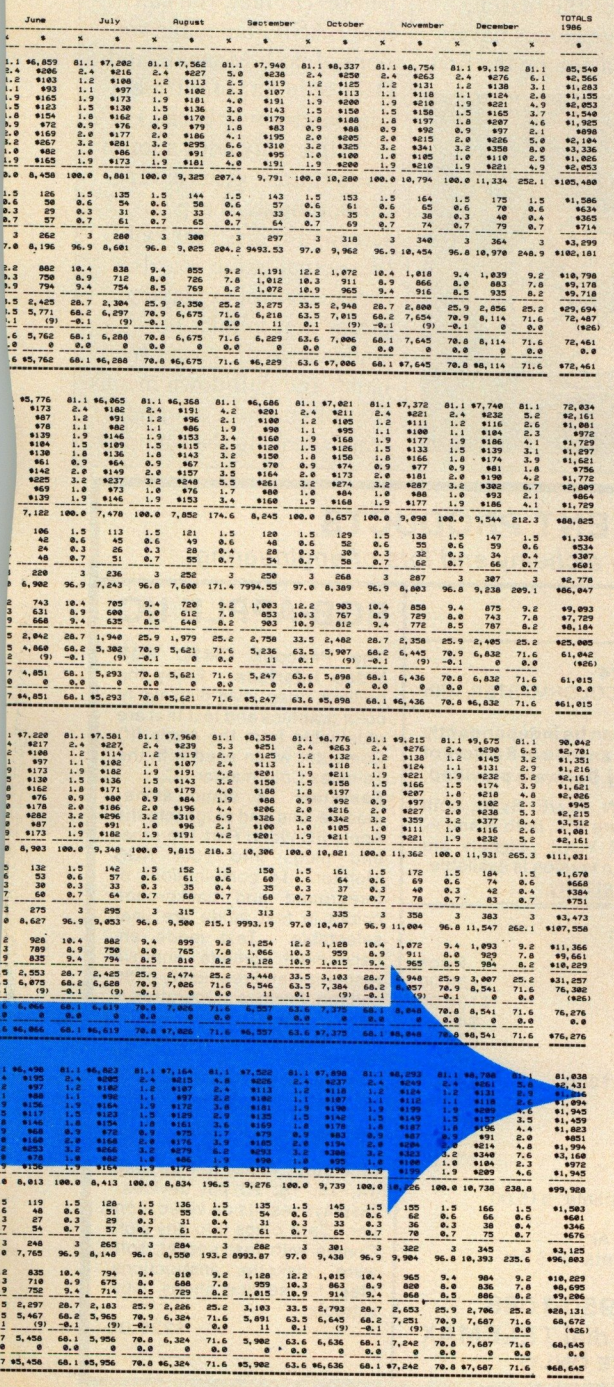
Retail Products	54 1.5	58 1.5	62 1.5	66 1.5	65 1.5	70 1.5	75 1.5	80 1.5	80 1.5	85 1.5	91 1.5	97 1.5	$883	97 1.5	104 1.5	111 1.5	119 1.5	
Direct Sale Products	22 0.6	23 0.6	25 0.6	26 0.6	26 0.6	28 0.6	30 0.6	32 0.6	32 0.6	34 0.6	36 0.6	39 0.6	$353	39 0.6	41 0.6	44 0.6	47 0.6	
OEM Products	12 0.3	13 0.3	14 0.3	15 0.4	15 0.3	16 0.3	17 0.3	18 0.4	18 0.3	20 0.3	21 0.3	22 0.4	$203	22 0.3	24 0.3	25 0.3	27 0.4	
VAR Products	24 0.7	26 0.7	28 0.7	29 0.7	30 0.7	32 0.7	34 0.7	36 0.7	36 0.7	38 0.7	41 0.7	44 0.7	$397	44 0.7	47 0.7	50 0.7	53 0.7	
Total Cost of Goods Sold	112 3.0	120 3.3	129 3.2	136 3.2	137 3	146 3	156 3	167 3	166 3	177 3	190 3	202 3	$1,837	201 3	215 3	230 3	246 3	
Gross Profit	3,586 96.8	3,555 96.8	3,937 96.8	4,134 91.8	4349.89 97.0	4,564 96.9	4,789 96.8	5,025 112.3	5286.35 97.0	5,547 96.9	5,821 96.8	6,108 137.1	$56,898	6425.59 97.0	6,743 96.9	7,076 96.8	7,425 167.4	
Operating Expenses:																		
Marketing	449 12.2	484 13.4	384 9.4	391 9.2	546 12.2	491 10.4	466 9.4	476 9.2	663 12.2	597 10.4	567 9.4	578 9.2	$6,013	806 12.2	726 10.4	689 9.4	703 9.2	
Development	382 10.3	343 8.9	326 8.0	333 7.8	464 10.3	417 8.9	397 8.0	404 7.8	564 10.3	507 8.9	482 8.0	492 7.8	$5,111	685 10.3	617 8.9	586 8.0	598 7.8	
Finance & Admin.	404 10.9	364 9.4	345 8.5	358 8.2	491 10.9	442 9.4	420 8.5	428 8.2	597 10.9	537 9.4	510 8.5	521 8.2	$5,411	726 10.9	653 9.4	620 8.5	633 8.2	
Total Expenses	1,234 33.5	1,111 28.7	1,055 25.9	1,077 25.2	1,500 33.5	1,350 28.7	1,283 25.9	1,309 25.2	1,824 33.5	1,641 28.7	1,559 25.9	1,591 25.2	$16,535	2,217 33.5	1,995 28.7	1,895 25.9	1,933 25.2	
Income Oprns	2,344 63.6	2,644 68.2	2,885 70.9	3,058 71.6	2,849 63.5	3,213 68.2	3,506 70.9	3,717 71.6	3,463 63.5	3,906 68.2	4,262 70.9	4,518 71.6	40,363	4,209 63.5	4,748 68.2	5,180 70.9	5,492 71.6	
Interest Inc. (Exp)	11 0.3	(9) -0.2	(9) -0.2	0 0.0	11 0.2	(9) -0.2	(9) -0.2	0 0.0	11 0.2	(9) -0.2	(9) -0.1	0 0.0	(621)	11 0.2	(9) -0.1	(9) -0.1	0 0.0	
Income before Taxes	2,355 63.8	2,635 68.0	2,876 70.7	3,058 71.6	2,860 63.8	3,204 68.0	3,497 70.7	3,717 71.6	3,474 63.7	3,897 68.1	4,253 70.8	4,518 71.6	40,342	4,220 63.7	4,739 68.1	5,171 70.8	5,492 71.6	
Prov. Inc. Taxes	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0	0 0.0	0 0.0	0 0.0	0 0.0	
Net Income (Loss)	$2,355 63.8	$2,635 68.0	$2,876 70.7	$3,058 71.6	$2,860 63.8	$3,204 68.0	$3,497 70.7	$3,717 71.6	$3,474 63.7	$3,897 68.1	$4,253 70.8	$4,518 71.6	$40,342	$4,220 63.7	$4,739 68.1	$5,171 70.8	$5,492 71.6	
EASTERN OPERATIONS																		
Net Revenues:																		
Retail Prod Under 1K	$2,520 81.1	$2,646 81.1	$2,778 81.1	$2,917 81.1	$3,063 81.1	$3,216 81.1	$3,377 81.1	$3,546 81.1	$3,723 81.1	$3,909 81.1	$4,105 81.1	$4,310 81.1	$40,111	$4,526 81.1	$4,752 81.1	$4,989 81.1	$5,239 81.1	
Retail Prod Under 5K	$76 2.4	$79 2.4	$83 2.4	$88 1.9	$92 2.4	$96 2.4	$101 2.4	$106 2.4	$112 2.4	$117 2.4	$123 2.4	$129 2.9	$1,203	$136 2.4	$143 2.4	$150 2.4	$157 3.5	
Retail Prod Under 5K	$38 1.2	$40 1.2	$42 1.2	$44 1.0	$46 1.2	$48 1.2	$51 1.2	$53 1.2	$56 1.2	$59 1.2	$62 1.2	$65 1.4	$602	$68 1.2	$71 1.2	$75 1.2	$79 1.7	
Retail Prod Under 5K	$34 1.1	$36 1.1	$38 1.1	$39 0.9	$41 1.1	$43 1.1	$46 1.1	$48 1.1	$50 1.1	$53 1.1	$55 1.1	$58 1.3	$542	$61 1.1	$64 1.1	$67 1.1	$71 1.6	
Direct Prod Under 1K	$68 1.9	$64 1.9	$67 1.9	$70 1.6	$74 1.9	$77 1.9	$81 1.9	$84 1.9	$87 1.9	$91 1.9	$95 1.9	$99 2.2	$903	$109 1.9	$114 1.9	$120 1.9	$126 2.6	
Direct Prod Under 5K	$45 1.5	$48 1.5	$50 1.5	$53 1.2	$55 1.5	$58 1.5	$61 1.5	$64 1.4	$67 1.5	$70 1.5	$74 1.5	$77 1.7	$722	$81 1.5	$86 1.5	$90 1.5	$94 2.1	
Direct Prod over 5K	$57 1.8	$60 1.8	$63 1.8	$66 1.5	$69 1.8	$72 1.8	$76 1.8	$80 1.8	$84 1.8	$88 1.8	$92 1.8	$97 2.2	$903	$102 1.8	$107 1.8	$112 1.8	$118 2.6	
OEM Prod Under 1K	$26 0.9	$28 0.9	$29 0.9	$31 0.7	$32 0.9	$34 0.9	$35 0.9	$37 0.8	$39 0.9	$41 0.9	$43 0.9	$45 1.0	$421	$48 0.9	$50 0.9	$52 0.9	$55 1.2	
OEM Prod Under 5K	$62 2.0	$65 2.0	$68 2.0	$72 1.6	$75 2.0	$79 2.0	$83 2.0	$87 1.9	$92 2.0	$96 2.0	$101 2.0	$106 2.4	$987	$111 2.0	$117 2.0	$123 2.0	$129 2.9	
OEM Prod over 5K	$98 3.2	$103 3.2	$108 3.2	$114 2.5	$119 3.2	$125 3.2	$132 3.2	$138 3.1	$145 3.2	$152 3.2	$160 3.2	$168 3.7	$1,564	$176 3.2	$185 3.2	$195 3.2	$204 4.	
VAR Prod Under 1K	$38 1.0	$32 1.0	$33 1.0	$35 0.8	$37 1.0	$39 1.0	$41 1.0	$43 0.9	$45 1.0	$47 1.0	$49 1.0	$52 1.2	$481	$54 1.0	$57 1.0	$60 1.0	$63 1.	
VAR Prod Under 5K	$60 1.9	$64 1.9	$67 1.9	$70 1.6	$74 1.9	$77 1.9	$81 1.9	$85 1.9	$89 1.9	$94 1.9	$99 1.9	$103 2.3	$963	$109 1.9	$114 1.9	$120 1.9	$126 2.	
VAR Prod over 5K													$49,461	5,580 100.0	5,859 100.0	6,152 100.0	6,460 143.	
Total Net Revenues	3,107 100.0	3,263 100.0	3,426 100.0	3,597 80.0	3,777 100.0	3,966 100.0	4,164 100.0	4,372 97.2	4,591 100.0	4,821 100.0	5,062 100.0	5,315 118.2						
Cost of Goods Sold:																		
Retail Products	45 1.5	49 1.5	52 1.5	56 1.5	55 1.5	59 1.5	63 1.5	68 1.5	67 1.5	72 1.5	77 1.5	82 1.5	$744	81 1.5	87 1.5	93 1.5	100 1.	
Direct Sale Products	18 0.6	19 0.6	21 0.6	22 0.6	22 0.6	24 0.6	25 0.6	27 0.6	27 0.6	29 0.6	31 0.6	33 0.6	$297	33 0.6	35 0.6	37 0.6	40 0.6	
OEM Products	10 0.3	11 0.3	12 0.3	12 0.3	13 0.3	14 0.3	15 0.3	16 0.4	15 0.3	16 0.3	18 0.3	19 0.4	$171	19 0.3	20 0.3	21 0.3	23 0.4	
VAR Products	28 0.7	22 0.7	23 0.7	25 0.7	25 0.7	27 0.7	28 0.7	30 0.7	30 0.7	32 0.7	35 0.7	37 0.7	$335	37 0.7	39 0.7	42 0.7	45 0.7	
Total COGS	94 3	101 3	108 3	116 3	115 3	123 3	131 3	140 3	139 3	149 3	160 3	171 3	$1,547	169 3	181 3	194 3	208 3	
Gross Profit	3013.06 97.0	3,162 96.9	3,318 96.8	3,482 76.8	3662.39 97.0	3,843 96.9	4,033 96.8	4,232 94.0	4451.66 97.0	4,671 96.9	4,902 96.8	5,144 115.8	$47,914	5411.82 97.0	5,678 96.9	5,958 96.8	6,253 140.5	
Operating Expenses:																		
Marketing	378 12.2	340 10.4	323 9.4	330 9.2	459 12.2	414 10.4	393 9.4	401 9.2	558 12.2	503 10.4	477 9.4	487 9.2	$5,063	679 12.2	611 10.4	580 9.4	592 9.2	
Development	321 10.3	289 8.9	275 8.0	280 7.8	391 10.3	351 8.9	334 8.0	341 7.8	475 10.3	427 8.9	406 8.0	414 7.8	$4,304	577 10.3	519 8.9	492 8.0	503 7.8	
Finance & Admin	340 10.9	305 9.4	291 8.5	297 8.2	414 10.9	372 9.4	354 8.5	361 8.2	503 10.9	452 9.4	430 8.5	438 8.2	$4,557	611 10.9	558 9.4	522 8.5	533 8.2	
Total Expenses	1,039 33.5	936 28.7	889 25.9	907 25.2	1,264 33.5	1,137 28.7	1,080 25.9	1,102 25.2	1,536 33.5	1,380 28.7	1,313 25.9	1,339 25.2	$13,924	1,867 33.5	1,688 28.7	1,594 25.9	1,628 25.2	
Income Oprns	1,974 63.6	2,225 68.2	2,429 70.9	2,575 71.6	2,399 63.5	2,706 68.2	2,953 70.9	3,130 71.6	2,916 63.5	3,289 68.2	3,589 70.9	3,805 71.6	$33,990	3,544 63.5	3,990 68.2	4,364 70.9	4,624 71.6	
Interest Inc. (Exp)	11 0.3	(9) -0.3	(9) -0.3	0 0.0	11 0.3	(9) -0.2	(9) -0.2	0 0.0	11 0.2	(9) -0.2	(9) -0.2	0 0.0	(621)	11 0.2	(9) -0.2	(9) -0.1	0 0.0	
Income before Taxes	1,985 63.9	2,217 68.0	2,420 70.6	2,575 71.6	2,410 63.8	2,697 68.0	2,944 70.7	3,130 71.6	2,927 63.8	3,280 68.0	3,580 70.7	3,805 71.6	$33,369	3,555 63.7	3,989 68.1	4,353 70.8	4,624 71.6	
Prov. Inc. Taxes	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0	0 0.0	0 0.0	0 0.0	0 0.0	
Net Income (Loss)	$1,985 63.9	$2,217 68.0	$2,420 70.6	$2,575 71.6	$2,410 63.8	$2,697 68.0	$2,944 70.7	$3,130 71.6	$2,927 63.8	$3,280 68.0	$3,580 70.7	$3,805 71.6	$33,369	$3,555 63.7	$3,989 68.1	$4,353 70.8	$4,624 71.6	
NORTHERN OPERATIONS																		
Net Revenues:																		
Retail Prod Under 1K	$3,150 81.1	$3,308 81.1	$3,473 81.1	$3,647 81.1	$3,829 81.1	$4,020 81.1	$4,221 81.1	$4,432 81.1	$4,654 81.1	$4,887 81.1	$5,131 81.1	$5,388 81.1	$50,129	$5,657 81.1	$5,940 81.1	$6,237 81.1	$6,549 81.1	
Retail Prod Under 5K	$95 2.4	$99 2.4	$103 2.4	$109 2.4	$115 2.4	$120 2.4	$126 2.4	$132 2.4	$139 2.4	$147 2.4	$154 2.4	$162 3.5	$1,504	$170 2.4	$178 2.4	$187 2.4	$196 4.4	
Retail Prod Under 5K	$47 1.2	$50 1.2	$52 1.2	$55 1.2	$57 1.2	$60 1.2	$63 1.2	$66 1.5	$70 1.2	$73 1.2	$77 1.2	$81 1.8	$752	$85 1.2	$89 1.2	$94 1.2	$98 2.2	
Retail Prod over 5K	$43 1.1	$45 1.1	$47 1.1	$49 1.1	$52 1.1	$54 1.1	$57 1.1	$60 1.3	$63 1.1	$66 1.1	$69 1.1	$73 1.6	$677	$76 1.1	$80 1.1	$84 1.1	$88 2.0	
Direct Prod Under 1K	$76 1.9	$79 1.9	$83 1.9	$88 1.9	$92 1.9	$96 1.9	$101 1.9	$106 2.4	$112 1.9	$117 1.9	$123 1.9	$129 2.9	$1,128	$136 1.9	$143 1.9	$150 1.9	$157 3.5	
Direct Prod Under 5K	$57 1.5	$60 1.5	$63 1.5	$66 1.5	$69 1.5	$72 1.5	$76 1.5	$80 1.8	$84 1.5	$88 1.5	$92 1.5	$97 2.1	$903	$102 1.5	$107 1.5	$112 1.5	$118 2.6	
Direct Prod over 5K	$71 1.8	$74 1.8	$78 1.8	$82 1.8	$86 1.8	$90 1.8	$95 1.8	$100 2.2	$105 1.8	$110 1.8	$115 1.8	$121 2.7	$1,128	$127 1.8	$134 1.8	$140 1.8	$147 3.3	
OEM Prod Under 1K	$33 0.9	$35 0.9	$36 0.9	$38 0.9	$40 0.9	$42 0.9	$44 0.9	$46 1.0	$49 0.9	$51 0.9	$54 0.9	$57 1.3	$526	$59 0.9	$62 0.9	$65 0.9	$69 1.5	
OEM Prod Under 5K	$77 2.0	$81 2.0	$85 2.0	$90 2.0	$94 2.0	$99 2.0	$104 2.0	$109 2.4	$114 2.0	$120 2.0	$126 2.9	$133 3.0	$1,233	$139 2.0	$146 2.0	$153 2.0	$161 3.6	
OEM Prod over 5K	$123 3.2	$129 3.2	$135 3.2	$142 3.2	$149 3.2	$157 3.2	$165 3.2	$173 3.8	$182 3.2	$191 3.2	$200 3.2	$210 4.7	$1,955	$221 3.2	$232 3.2	$243 3.2	$255 5.7	
VAR Prod Under 1K	$38 1.0	$40 1.0	$42 1.0	$44 1.0	$46 1.0	$48 1.0	$51 1.0	$53 1.2	$56 1.0	$59 1.0	$62 1.0	$65 1.4	$602	$68 1.0	$71 1.0	$75 1.0	$79 1.7	
VAR Prod Under 5K	$76 1.9	$79 1.9	$83 1.9	$88 1.9	$92 1.9	$96 1.9	$101 1.9	$106 2.4	$112 1.9	$117 1.9	$123 1.9	$129 2.9	$1,203	$136 1.9	$143 1.9	$150 1.9	$157 3.5	
VAR Prod over 5K													$61,826	6,976 100.0	7,324 100.0	7,691 100.0	8,075 179.6	
Total Net Revenues	3,884 100.0	4,078 100.0	4,282 100.0	4,497 100.0	4,721 100.0	4,957 100.0	5,205 100.0	5,466 121.6	5,739 100.0	6,026 100.0	6,387 100.0	6,643 147.7						
Cost of Goods Sold:																		
Retail Products	57 1.5	61 1.5	65 1.5	69 1.5	69 1.5	74 1.5	79 1.5	84 1.5	84 1.5	90 1.5	96 1.5	103 1.5	$938	102 1.5	109 1.5	117 1.5	125 1.5	
Direct Sale Products	23 0.6	24 0.6	26 0.6	28 0.6	28 0.6	29 0.6	32 0.6	34 0.6	34 0.6	36 0.6	38 0.6	41 0.6	$372	41 0.6	44 0.6	47 0.6	50 0.6	
OEM Products	13 0.3	14 0.3	15 0.3	16 0.4	16 0.3	17 0.3	18 0.3	19 0.4	19 0.3	21 0.3	22 0.3	24 0.4	$214	23 0.3	25 0.3	27 0.3	29 0.4	
VAR Products	26 0.7	27 0.7	29 0.7	31 0.7	31 0.7	33 0.7	36 0.7	38 0.7	38 0.7	40 0.7	43 0.7	46 0.7	$418	46 0.7	49 0.7	52 0.7	56 0.7	
Total COGS	119 3	126 3	135 3	144 3	143 3	153 3	164 3	176 3	174 3	186 3	199 3	213 3	$1,934	212 3	227 3	242 3	259 3	
Gross Profit	3766.32 97.0	3,952 96.9	4,147 96.8	4,352 96.8	4577.99 97.0	4,804 96.9	5,041 96.8	5,290 118.3	5564.58 97.0	5,839 96.9	6,188 96.8	6,430 144.5	$59,893	6763.78 97.0	7,098 96.9	7,448 96.8	7,816 176.4	
Operating Expenses:																		
Marketing	473 12.2	425 10.4	404 9.4	412 9.2	574 12.2	517 10.4	491 9.4	501 9.2	698 12.2	628 10.4	597 9.4	609 9.2	$6,329	849 12.2	764 10.4	726 9.4	749 9.2	
Development	402 10.3	361 8.9	343 8.0	350 7.8	488 10.3	439 8.9	417 8.0	426 7.8	593 10.3	534 8.9	507 8.0	517 7.8	$5,380	721 10.3	649 8.9	617 8.0	629 7.8	
Finance & Admin	425 10.9	382 9.4	364 8.5	371 8.2	517 10.9	465 9.4	442 8.5	451 8.2	628 10.9	565 9.4	537 8.5	548 8.2	$5,696	764 10.9	687 9.4	653 8.5	666 8.2	
Total Expenses	1,299 33.5	1,169 28.7	1,111 25.9	1,133 25.2	1,579 33.5	1,421 28.7	1,350 25.9	1,377 25.2	1,928 33.5	1,728 28.7	1,641 25.9	1,674 25.2	$17,405	2,333 33.5	2,100 28.7	1,995 25.9	2,035 25.2	
Income Oprns	2,467 63.5	2,783 68.2	3,036 70.9	3,219 71.6	2,999 63.5	3,383 68.2	3,691 70.9	3,913 71.6	3,645 63.5	4,112 68.2	4,486 70.9	4,756 71.6	$42,488	4,430 63.5	4,998 68.2	5,453 70.9	5,781 71.6	
Interest Inc. (Exp)	11 0.3	(9) -0.2	(9) -0.2	0 0.0	11 0.2	(9) -0.2	(9) -0.2	0 0.0	11 0.2	(9) -0.2	(9) -0.1	0 0.0	(621)	11 0.2	(9) -0.1	(9) -0.1	0 0.0	
Income before Taxes	2,478 63.8	2,774 68.0	3,027 70.7	3,219 71.6	3,010 63.7	3,374 68.1	3,682 70.7	3,913 71.6	3,656 63.7	4,103 68.1	4,477 70.8	4,756 71.6	$42,467	4,441 63.7	4,989 68.1	5,444 70.8	5,781 71.6	
Prov. Inc. Taxes	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0	0 0.0	0 0.0	0 0.0	0 0.0	
Net Income (Loss)	$2,478 63.8	$2,774 68.0	$3,027 70.7	$3,219 71.6	$3,010 63.7	$3,374 68.1	$3,682 70.7	$3,913 71.6	$3,656 63.7	$4,103 68.1	$4,477 70.8	$4,756 71.6	$42,467	$4,441 63.7	$4,989 68.1	$5,444 70.8	$5,781 71.6	
SOUTHERN OPERATIONS																		
Net Revenues:																		
Retail Prod Under 1K	$3,150 81.1	$3,308 81.1	$3,473 81.1	$3,647 81.1	$3,829 81.1	$4,020 81.1	$4,221 81.1	$4,432 81.1	$4,654 81.1	$4,887 81.1	$5,131 81.1	$5,388 81.1	$50,129	$5,657 81.1	$5,940 81.1	$6,237 81.1	$6,549 81.1	
Retail Prod Under 5K	$95 2.4	$99 2.4	$103 2.4	$109 2.4	$115 2.4	$120 2.4	$126 2.4	$132 2.4	$139 2.4	$147 2.4	$154 2.4	$162 3.5	$1,504	$170 2.4	$178 2.4	$187 2.4	$196 4.4	
Retail Prod Under 5K	$47 1.2	$50 1.2	$52 1.2	$55 1.2	$57 1.2	$60 1.2	$63 1.2	$66 1.5	$70 1.2	$73 1.2	$77 1.2	$81 1.8	$752	$85 1.2	$89 1.2	$94 1.2	$98 2.2	
Retail Prod over 5K	$43 1.1	$45 1.1	$47 1.1	$49 1.1	$52 1.1	$54 1.1	$57 1.1	$60 1.3	$63 1.1	$66 1.1	$69 1.1	$73 1.6	$677	$76 1.1	$80 1.1	$84 1.1	$88 2.0	
Direct Prod Under 1K	$76 1.9	$79 1.9	$83 1.9	$88 1.9	$92 1.9	$96 1.9	$101 1.9	$106 2.4	$112 1.9	$117 1.9	$123 1.9	$129 2.9	$1,128	$136 1.9	$143 1.9	$150 1.9	$157 3.5	
Direct Prod Under 5K	$57 1.5	$60 1.5	$63 1.5	$66 1.5	$69 1.5	$72 1.5	$76 1.5	$80 1.8	$84 1.5	$88 1.5	$92 1.5	$97 2.1	$903	$102 1.5	$107 1.5	$112 1.5	$118 2.6	
Direct Prod over 5K	$71 1.8	$74 1.8	$78 1.8	$82 1.8	$86 1.8	$90 1.8	$95 1.8	$100 2.2	$105 1.8	$110 1.8	$115 1.8	$121 2.7	$1,128	$127 1.8	$134 1.8	$140 1.8	$147 3.3	
OEM Prod Under 1K	$33 0.9	$35 0.9	$36 0.9	$38 0.9	$40 0.9	$42 0.9	$44 0.9	$46 1.0	$49 0.9	$51 0.9	$54 0.9	$57 1.3	$526	$59 0.9	$62 0.9	$65 0.9	$69 1.5	
OEM Prod Under 5K	$77 2.0	$81 2.0	$85 2.0	$90 2.0	$94 2.0	$99 2.0	$104 2.0	$109 2.4	$114 2.0	$120 2.0	$126 2.9	$133 3.0	$1,233	$139 2.0	$146 2.0	$153 2.0	$161 3.6	
OEM Prod over 5K	$123 3.2	$129 3.2	$135 3.2	$142 3.2	$149 3.2	$157 3.2	$165 3.2	$173 3.8	$182 3.2	$191 3.2	$200 3.2	$210 4.7	$1,955	$221 3.2	$232 3.2	$243 3.2	$255 5.7	
VAR Prod Under 1K	$38 1.0	$40 1.0	$42 1.0	$44 1.0	$46 1.0	$48 1.0	$51 1.0	$53 1.2	$56 1.0	$59 1.0	$62 1.0	$65 1.4	$602	$68 1.0	$71 1.0	$75 1.0	$79 1.7	
VAR Prod Under 5K	$76 1.9	$79 1.9	$83 1.9	$88 1.9	$92 1.9	$96 1.9	$101 1.9	$106 2.4	$112 1.9	$117 1.9	$123 1.9	$129 2.9	$1,203	$136 1.9	$143 1.9	$150 1.9	$157 3.5	
VAR Prod over 5K													$61,826	6,976 100.0	7,324 100.0	7,691 100.0	8,075 179.6	
Total Net Revenues	3,884 100.0	4,078 100.0	4,282 100.0	4,497 100.0	4,721 100.0	4,957 100.0	5,205 100.0	5,466 121.6	5,739 100.0	6,026 100.0	6,387 100.0	6,643 147.7						
Cost of Goods Sold:																		
Retail Products	57 1.5	61 1.5	65 1.5	69 1.5	69 1.5	74 1.5	79 1.5	84 1.5	84 1.5	90 1.5	96 1.5	103 1.5	$938	102 1.5	109 1.5	117 1.5	125 1.5	
Direct Sale Products	23 0.6	24 0.6	26 0.6	28 0.6	28 0.6	29 0.6	32 0.6	34 0.6	34 0.6	36 0.6	38 0.6	41 0.6	$372	41 0.6	44 0.6	47 0.6	50 0.6	
OEM Products	13 0.3	14 0.3	15 0.3	16 0.4	16 0.3	17 0.3	18 0.3	19 0.4	19 0.3	21 0.3	22 0.3	24 0.4	$214	23 0.3	25 0.3	27 0.3	29 0.4	
VAR Products	26 0.7	27 0.7	29 0.7	31 0.7

Case.



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you've got to have patience. It also helps to put on a good show.) The nonhistorical scenarios allow those of us who didn't sleep through history and geography to have our own "unknown" out there to discover.

Don't Lose the Gold

I recommend that you consider keeping a journal and supplementary maps when you play this game. It's a frustrating experience to forget where you left a cache of 5000 gold pieces.

David Long

Seven Cities of Gold
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CIRCLE READER SERVICE NO. **381**

OLD WINE, NEW BOTTLE

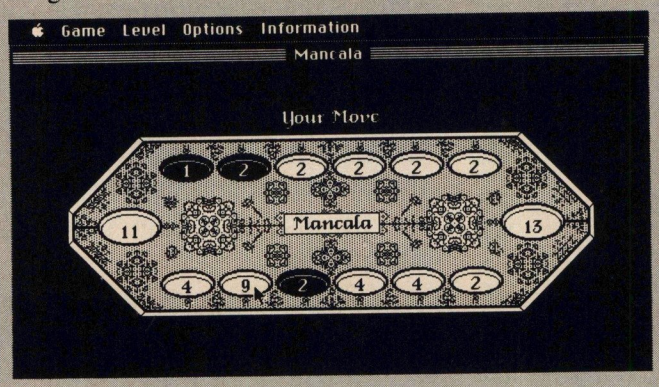
There is something unusually appealing about playing ancient games on a modern computer.

Maybe it's the contrast of the eternal game, lurking somewhere deep in our subconscious, coming slap against the newest wave of technology.

Maybe it's because these old games are built around the same kind of simple, straightforward logic that also inspires the creation of computers.

Or maybe it's just because programmers who write old games for new computers are able to give their all, without worrying about the convoluted ins and outs of copyright law before putting game to disk.

Whatever the reason, these vintage games have always been among the first to arrive for each new generation of computer.



Three On One

Triple Play has brought three of them onto one Macintosh disk: Backgammon, Mancala (sometimes known as Awari), and Deduce (a game that's quite similar to Mastermind).

All three have found their way onto computers before. (In fact, you can find BASIC-language versions of both Mancala and Deduce in lots of different computer-game books.)

Triple Play adds a lot to these simple, generic versions, though: sharp on-screen graphics that look like actual game boards; mouse control of playing pieces that mimics how you'd move the pieces by hand; and pull-down menus that offer a host of options, from silencing the sound ef-

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CIRCLE 350 ON READER SERVICE CARD

fects to reviewing a game from start to finish.

Each game pits you against the Macintosh, but don't worry about the 68000 always outpacing you. You can select a playing level for each game, from beginning to advanced. In backgammon you can even switch playing levels in the middle of a game.

The disk comes packed in a Styrofoam container, without a manual. All the instructions you need to play each game are included right in the program, as are a history of the game and a summary of the rules.

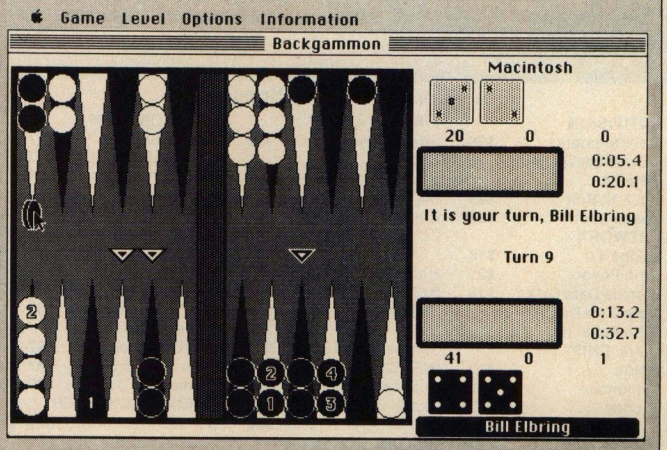
Overall, the instructions are good and the graphics well designed. The program runs smoothly. What more could you ask? Still, each game, as you'd expect, does have its quirks.

Mancala

Take Mancala, for example. The idea behind the game is quite simple. Two players face each other, with two rows of stones in six small pits between them. At each end is a scoring pit.

To play, you simply pick up stones from one pit and distribute them one by one into each pit to the right. At the end, the player with the most stones in the scoring pit wins the game.

On screen is a striking image of a carefully crafted playing board. Instead of actually showing the stones in each pit, however (which would have been easy enough with the Macintosh), the screen displays only the number of stones per pit. This situation detracts from the overall visual effect, although it makes it easier to see instantly how many stones you have.

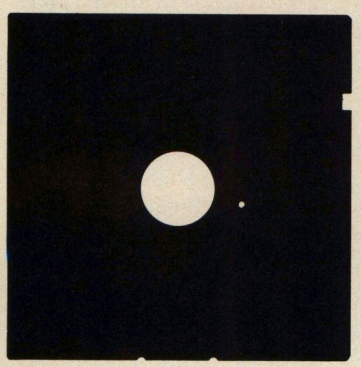


Mancala gets smarter as you play. Just because you beat it one time with one strategy doesn't mean you can win again.

Here's the rub, though: the Mac plays Mancala to tie. Get it into a tie game, and it will keep playing the same strategy over and over until you change your moves.

Backgammon

If you're competitive by nature, you'll probably respond well to a feature of the Backgammon part of Triple Play—a contest in which 20 players will be awarded $200 apiece. (You must, however, get your entry in by May 15, 1985; so whizzes at Backgammon should move quickly if they're interested.)



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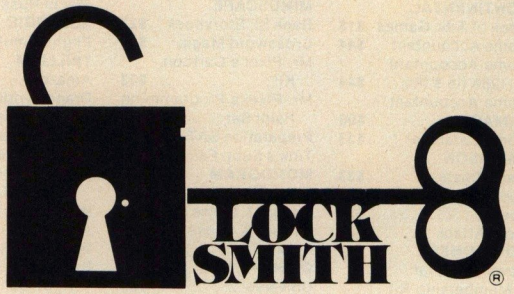

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THAT'S enter▶tainment

The Backgammon portion of the program is designed to duplicate an actual game—all the way down to the fact that you must move each piece manually with the mouse. A couple of shortcuts you'd expect from computerized backgammon aren't here: you can't just click on the piece you want to move; and you can't combine the total on both dice in a single move. Also, the game doesn't include a doubling cube, a betting add-on that can intensify strategies and allow you to finish games more quickly.

As you're playing, Backgammon can display all possible moves for you and even suggest which move is a good one—both of which are useful to the novice.

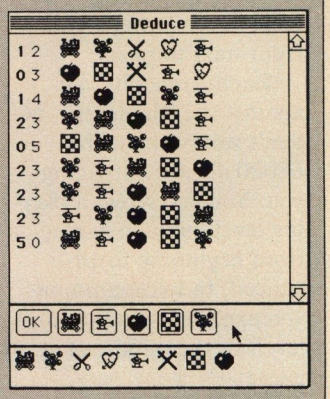
Deduce

The third part of Triple Play, Deduce, is a guessing game in which you try to figure out the exact placement of a series of tokens. After each guess, the computer tells you how many tokens you've placed correctly and how many tokens were chosen correctly, but are in the wrong place. It won't, however, tell you which are right and which are wrong.

▶ Deduce is an exercise in logic.

You have up to 50 guesses to deduce which token goes where. Deduce is an exercise in logic—you can always find a way to figure out the right answer. It's not always easy, though. If you're ever frustrated, you can check the right answer right away.

If you want to experiment on your own, Deduce gives you wide options for setting up the board. You first select the number of tokens (6–10) and the number of spaces (4–10) you want to use (you don't have to use the same number of each). You then try to fit the tokens into the appropriate spaces. It's also your choice whether or not to allow tokens to be used more than once.



The tokens themselves are interesting little graphic characters of trains, pickaxes, checkerboards, and the like. You select them one by one with the mouse, or you select an entire row at once (for instance, a row in which you came close to the right answer) and just edit one or two of the tokens.

Triple Play is available primarily through mail order, although you may be able to find a dealer that carries it. The price includes postage and handling. It's copy-protected; and no backup disk is provided.

J. Anthony Dirksen

Triple Play Game Disk Number 1
Triple Play
P.O. Box 6354
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List Price: $39.50
Requires: Macintosh

CIRCLE READER SERVICE NO. **382**

ANATOMY ADVENTURE

Contrary to the impression the title might give, Adventures in Flesh is not a seedy, X-rated, pornographic program to indulge your computerized fantasies. It is instead an educational game that uses a text-only adventure-game format to explore human anatomy and physiology.

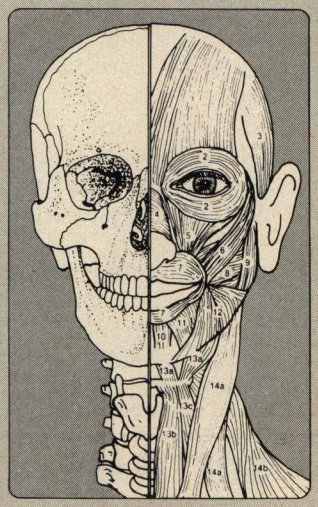
Remember an old television show called "Fantastic Voyage"? It featured a group of scientists navigating a submarine through a human body. Well, Adventures in Flesh is the computer version. The object is to find and diagnose 11 disorders in various parts of the body, and in the process, you reinforce lessons about human physiology.

As an adventure game, Adventures in Flesh is rather primitive, understanding only 100 words. You issue one-letter commands to indicate directions and two-word commands such as LOOK CELL and BLAST VIRUS to have it perform various activities. From time to time, communications from the outside detail external symptoms and help you zero in on disorders.

> The intent of the program is to explore the human body.

The disorders stand out like neon lights. You need no medical degree to match an internal observation with a disorder, but remember the intent of the program is to explore the human body. The disorders are only there to prod students to continue the game.

Navigating through the body to find 11 disorders can take a lot of time. Fortunately, you can save a game in progress. Aside from getting eaten by a white blood cell or falling out of one of the body's openings, you have little to fear. The biggest problem is getting lost in the lymphatic system. Do yourself a favor—don't forget that you are an infection, and stay away from the lymph nodes.



Adventures in Flesh includes a human-anatomy coloring book, which is a helpful guide for introducing human physiology to children. It is also a rudimentary road map of internal systems.

All in all, I appreciate Adventures in Flesh but caution that a background in physiology is almost a prerequisite to enjoy the program to its fullest.

Russ Lockwood

Adventures in Flesh
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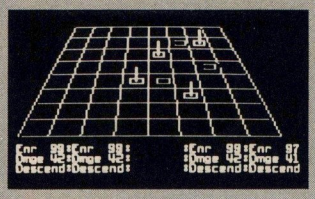
RACE TO SAVE CIVILIZATION

If your idea of a good game is one you can just pop into the disk drive and start playing, Omnitrend's Universe is not for you. But, if you love the challenge of a vast, complex game—with all the lure of a science-fiction fantasy—and if you yearn to captain your own ship—with all the challenge of studying charts, parts lists, and finances; making deals and running a business; piloting flights and planning military strategy—then Universe may provide the perfect vehicle for your flights of fancy.

Omnitrend's effort with this multidisk fantasy/simulation game is ambitious. The game's potential to fascinate possibly rivals that of the classic Wizardry, potentially supplying months (maybe even years) of complex science-fiction-based adventures and saving your progress to disk as you go. The manual offers detailed documentation—72 pages in an 8½ × 11-inch vinyl binder, with seven two-sided quick-reference cards (also



8½ × 11)—and you'll need every word of it because it contains critical information you need to maneuver the game, information that does not appear on the screen. (You should plan to have both manual and cards at hand, and be ready to thumb through them as you play.) Omnitrend sells supplements to the manual that supply even more detailed statistics for the advanced players.

The program includes some graphics, but it relies primarily on text. The game does use color, but a monochrome monitor works fine. The massive Universe program is contained on four diskettes and requires a fair amount of diskette swapping—especially for inexperienced players, since you find yourself constantly going back to pick up some item you've overlooked.

Here's the premise: At a time far in the future, space explorers from earth discover a hyperspace booster left by a technologically advanced alien culture. Humans have devised a hyperspace transportation system, but this alien device makes faster-than-light travel more efficient, enabling explorers to travel many light years further than ever before. As a game player, you are part of a colony established in another galaxy around the star Axia. The colony has received daily shipments of new technology from earth—its lifeline in this isolated region of the universe. Eighty days ago, however, these shipments suddenly stopped without explanation. The situation is desperate. The colony

> ▶ Universe may provide the perfect vehicle for your flights of fancy.

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cannot return to earth—the booster does not work in reverse—but just 15 days ago the Axian Central Educational Institute announced evidence that a second

> Your mission: to save the entire civilization from annihilation.

booster exists somewhere in the Local Group in the region of Axia. Your mission: to find this second booster, secure your fortune, and save the entire civilization from annihilation.

You'll have to spend a great deal of time preparing to play. You must obtain a loan, which is easy enough; but you are required to repay it, with interest, which means you must earn a living while you search for the booster. You must choose a ship design; buy and outfit your ship with crew, necessary parts, fuel, and computer programs; decide where to stow them all on board; and plan your expedition in such a way that you will be able to repay your loan out of profits from your money-making ventures (mining, trading, transporting passengers, and/or piracy). You must do all of these things while you search out the second hyperspace booster *and* fend off enemy attacks.

To me, this extensive preparation to play is the game's greatest drawback. It's possible to spend hours, days, even weeks to get well into the game—and that's frustrating. In fact, the complaint is so common that Omnitrend includes a sample game strategy in the manual to help you get your ship built and equipped;

> You'll have to spend a great deal of time preparing to play.

take you out to a Starport to pick up passengers; get you started with some mining, trading, and flight; and *then* send you off on your own.

Omnitrend is proud of providing solid customer support for registered owners. It provides updates to new versions and even offers two hours of free time on its Universe bulletin board, giving responses to questions and giving players a chance to exchange experiences and suggestions and post captain's logs.

Experienced Delight

Assuming that Omnitrend continues this support, Universe and the promised sequels are likely to delight experienced computer adventure-game players who are looking for a complex and ongoing challenge.

Diane Moser

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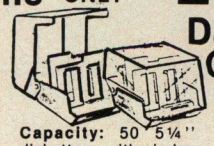

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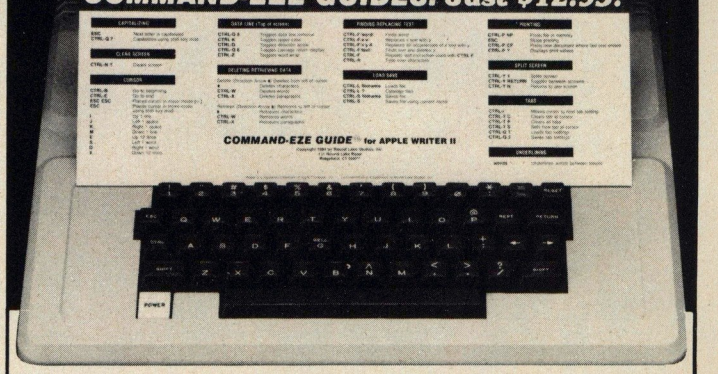

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CIRCLE 283 ON READER SERVICE CARD

RESCUE SQUAD
BY MICHAEL CALLERY
Questions from our readers

CATALOGING DISKS

Q. *I use Apple Writer IIe to write many short pieces that I need to refer back to. Is there a way to print out a catalog list so that I can have hard copy of the filenames?*

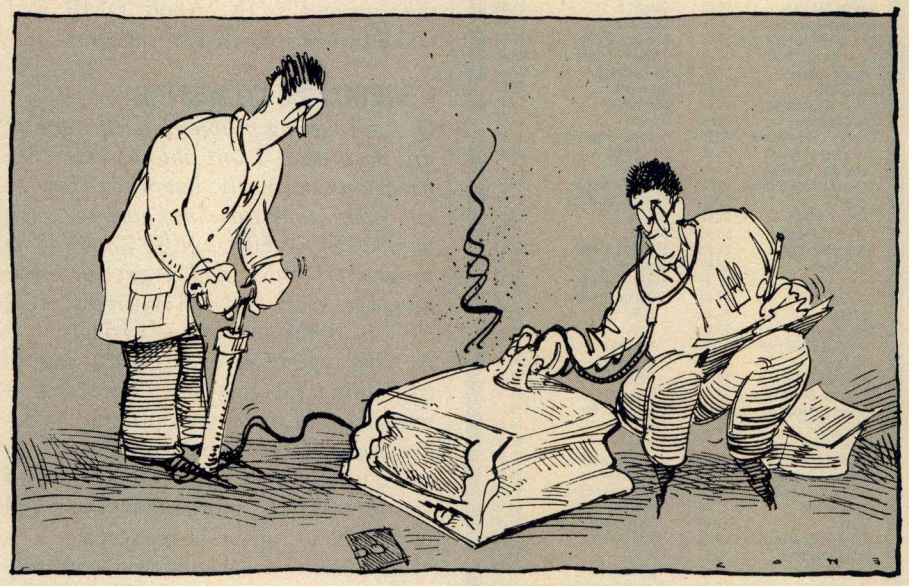
A. Sounds like you are a victim of Apple's new documentation policy. It's simple to get hard copy of the catalog of unprotected disks under either DOS 3.3 or ProDOS.

First, boot the DOS 3.3 System Master, the ProDOS User's Disk, or the Apple IIc System Utilities Disk, depending on the operating system your program uses. Apple Writer IIe uses DOS 3.3, and Apple Writer 2.0 uses ProDOS. Then you must enter BASIC. The DOS 3.3 System Master puts you into BASIC; from the menus of ProDOS disks, you'll have to choose to enter BASIC. You know you've entered BASIC when the Applesoft prompt (a square bracket) and cursor appear.

At this point, remove the DOS System Master or ProDOS User's or Utility disk and insert into the drive the disk you wish to catalog. Activate the printer by typing PR#1. (If your printer card is in another slot, use the correct slot number instead of 1.) Then type CATALOG, after which the printer will print the catalog listing. The printer will pause after it's printed a screenful of information; press any key to continue the listing. You may have to press the key a couple of times until the Applesoft prompt is printed on the printer. Deactivate the printer with a PR#0 (or PR#3 if the Apple is in the 80-column mode.)

If you are using ProDOS and you—or your application program—have created subdirectories, this procedure will not display the files in the subdirectories. The catalog listing shows subdirectories as files of the type DIR. To obtain subdirectory listings, issue a PREFIX/diskname/subdirname command at the Applesoft prompt, where */diskname* represents the name of the disk (it will be shown at the top of the catalog listing) and */subdirname* represents the name of the file with type DIR. Return to the main catalog after printing the subdirectory by typing a lone slash and pressing Return after issuing the PREFIX command.

This technique is useful with data disks from AppleWorks, VisiCalc, or any other application program.



WILLIAM CONE

IMAGEWRITER QUALITY PRINT

Q. *I have an Apple IIe and an Imagewriter connected via an Apple Super Serial Card. How can I obtain near-letter-quality or correspondence-quality printing, how can I get subscripts and superscripts, and how can I create custom fonts to print with the Imagewriter?*

A. The Imagewriter has a large selection of fonts, all accessible by printer-control codes. The best-looking fonts—of correspondence quality—are the proportional fonts: Elite (12 characters to the inch) and Pica (10 characters to the inch). How you direct the Imagewriter to use these fonts depends on what you are printing from. From BASIC, PR#1 (or the number of your printer-card slot other than 1) followed by PRINT CHR$(27);"p" turns on Pica proportional, and PRINT CHR$(27);"P" turns on Elite proportional.

In Apple Writer, the commands are Control-V Escape p Control-V and Control-V Escape P Control-V (*Escape* means pressing the Esc key). In AppleWorks, choose P1 or P2 from the Print Options menu (open-apple O). Consult the documentation of your application program if it isn't one of these.

As for your second question, there are no subscript or superscript command sequences for the Imagewriter. Some programs do create subscripts and superscripts by using reverse line feeds, though. AppleWorks is such a program.

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CIRCLE 231 ON READER SERVICE CARD

Finally, the Imagewriter supports up to 175 custom-designed characters—anything from a new font to Greek characters to math symbols. Designing your own characters and downloading them to the Imagewriter RAM is not simple, and Apple's documentation in Part 1 of the Imagewriter users' manual is opaque. If you need only one or two characters, you may get by with this information, but if you need a whole character set, your best bet is to purchase a commercial font downloader. One such program is Font Downloader from Micro-W Distributing, P.O. Box 113, Pompton Plains, NJ 07405; (201) 838-9027. Incidentally, versions of this program also support the Epson FX/JX, Apple DMP, and Okidata Microline 92/93 printers.

▶ MEMORY CLASHES

Q. *I am having problems with some of my programs. I am able to enter the programs normally, but when I try to run them, they turn into garbage such as* USR LET OVERFLOW 32 STORE. *The program bombs, and I get an error message such as* NEXT WITHOUT FOR ERROR. *What am I doing wrong?*

A. This type of error is usually due to conflicting memory use. The area of memory that stores your program is being overwritten by something else. You could be loading a shape table on top of your program or, more likely, you could merely be using the hi-res screen.

Applesoft programs are normally stored at memory location 2049 and up. Directly above your program in memory, BASIC stores your variable names and pointers to their actual location in memory. The hi-res screen starts at location 8192, giving you a grand total of 6144 bytes for your program and its variable table. If your program's variable table extends into the hi-res-screen area, the variables will be set to 0 when an HGR command is executed. If your program also extends into the hi-res-screen area, the end of the program will turn to garbage.

There are three ways to solve this conflict. The first, and simplest, solution is to use hi-res page 2. Replace all HGR instructions with HGR2, and you'll gain an additional 8K for your program and its variable table. If your program uses the text area at the bottom of the hi-res screen, or if you are using both hi-res pages for graphics, this solution will not work. The four-line text area below hi-res page 2 is not easily accessible from BASIC.

The second solution is to relocate

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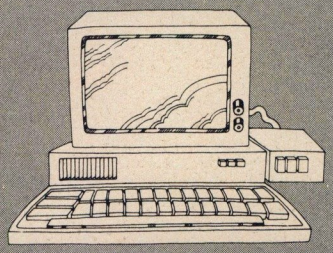

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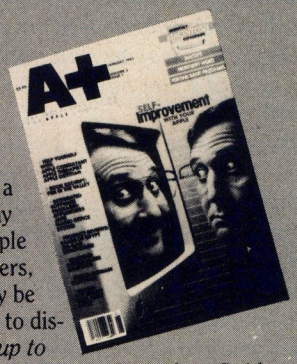

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your program above the hi-res page or pages. If you use this method, the BASIC work space can extend from 16384 (if your program uses only one hi-res page) or 24576 (if it uses both) to 38400, the beginning of DOS. You'll have 21.5K or 13.5K, respectively. If you move your program, you may have problems with string variables, as most string manipulations cause BASIC to create a copy of the string in high memory, starting at 38400 and building down. You can deal with them by making extra-careful use of string manipulation.

To move your program, use the following code as the Hello program on your disk (or as a start-up program for your actual program):

```
10 LOC=16384
20 HA=LOC/256: LA=LOC-HA*256
30 POKE LOC-1,0
40 POKE 103,LA:POKE 104,HA
50 PRINT CHR$(4);"RUN your
   program"
```

Change LOC to 24576 if you are using both hi-res pages, and change your program in line 50 to the name of your program. Save this program before running it, because it self-destructs after running once. Locations 103 and 104 are the pointers BASIC uses to determine where a program starts. Once you change them, BASIC loses track of this program and loads and runs the program specified in line 50 at the location specified in line 10.

Your final option is to compress the program so that it is smaller or to split the program so that it surrounds the hi-res pages. These options are more difficult to work with, as your programs will effectively be uneditable once they are compressed or split. You'll also have to purchase the utilities to perform the compression or splitting. (Beagle Bros. has such utilities).

▶ RGBLUES

Q. *I have a Taxan RGB Vision 1 and a Taxan 410-64 interface card in my Apple IIe. The card works perfectly for 80-column text and normal graphics, but when I use a double-hi-res program, such as Beagle Graphics, I don't get the extra colors—only the usual violet, green, orange, and blue. What's wrong?*

A. Apple's double-hi-res mode requires that the video signal be handled very differently from the way it is in the standard hi-res mode. (Technically, the clock rate on the double-hi-res video signal is twice as fast as it is on the nor-

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CIRCLE 146 ON READER SERVICE CARD

mal Apple video signal.) Some RGB-interface cards do not catch the accelerated signal and cannot generate the extra colors; double-hi-res graphics have only the standard hi-res colors. The Taxan card, unfortunately, is one of them. Taxan informs us that it is "working on a fix," so by the time you read this issue, you may be able to update the card.

We urge all readers to try out RGB-interface/monitor combinations at your dealer before you buy. A colleague and I have tested many combinations of RGB interfaces and monitors from an aesthetic standpoint. We prefer graphics on standard composite monitors and use a monochrome monitor for 80-column text. Two monitors may not be as convenient as one, but until the RGB technology settles down, using a couple of monitors may be the best way to go.

▸ OVERSTRIKE

Q. *Is it possible to overstrike arbitrary characters with MacWrite?*

A. Sorry, no. In MacWrite, you can create all commonly used international diacritical marks. To produce *è*, for example, type OPTION ` and then type *e*. When you press *e*, the letter with the accent will appear. You can similarly superimpose other accents, the circumflex, and umlaut on any vowel. Experiment a bit with the desk accessory Keycaps. All of these marks are produced in the same manner: OPTION mark followed by letter. Microsoft Word functions in the same way as MacWrite does in this respect.

If your needs go beyond marks over vowels, you have two options at present. One way to produce overstrike characters is to use MacPaint. You can type the overstrike marks separately and then use the lasso to drag them to their proper location over the desired letter. As difficult as this procedure might seem, it does give you complete control over your text.

Another approach is to create new fonts with the desired overstrike characters in place of the other characters. Apple has released the font editor and resource editor to developers, and they are commonly found in users' group Mac libraries. These tools have bugs, but they work. With them, you can design the overstrike characters you require and have them at your beck and call on the font menu of MacWrite. ✚

Please send your questions and problems to Rescue Squad, A+, 11 Davis Drive, Belmont, CA 94002.

Beagle Bros Apple® Software Report

Ad Number 201 — *"All the News That Fits"* — *Spring 1985*

Utilities

NEW!

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MORE: Set up de-bugging "breakpoints" so your program stops when you want. Search for strings and variables, *fast*—Almost any program can be searched in about 2 seconds!

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BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *fast* program tracing and de-bugging.

A$="ABC"
X=3.14159
Y=255
← **VARIABLE-DISPLAY:** Instantly prints all of your program's variables in the order used, with their current values

A$: 5 10 150
X: 10 20 3000
Y: 5 40 55 60
← **CROSS-REFERENCE:** Alphabetizes every variable your program uses, and displays them with their line numbers

Plus **AUTO-LINE-NUMBER**, new improved Re-Number, Hex-Dec Converter, Program Stats, eliminate or re-define the cursor...

```
10 TEXT: ? CHR$(21): HOME:
   POKE 33,7: REM Replace the
   periods in line 20 with spaces.
20 PRINT ".@@@@@@.@@@...
   @@@@.O.O.@@..^..@
   (..--.--.===--=./.....\
   .ASCII...ANNIE"
30 C=C*0: N=N+1: POKE 1539,
   173+16*C: FOR X=1 TO 9:
   POKE 1542+X, N+X: S=PEEK
   (49193+X): NEXT
40 IF N-246 THEN 30
```

10 TEXT: HOME: FOR P=0 TO 255: VTAB 1: NORMAL: PRINT "POKE 243,";P: POKE 243,P: LIST: NEXT: REM *Try replacing the 243's with 50's*

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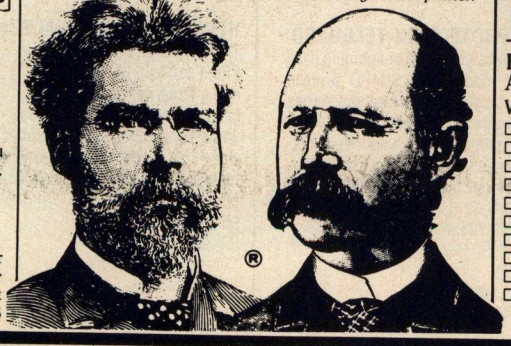

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```
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100   PRINT "TEST"
1000  NORMAL
10000 CALL 65338
```

And...

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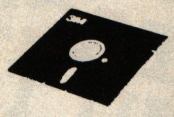

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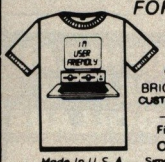

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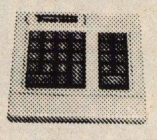

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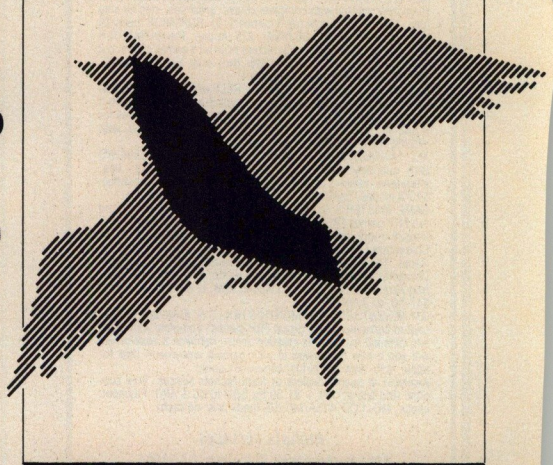

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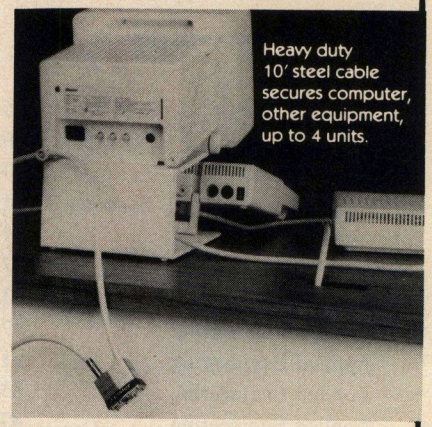

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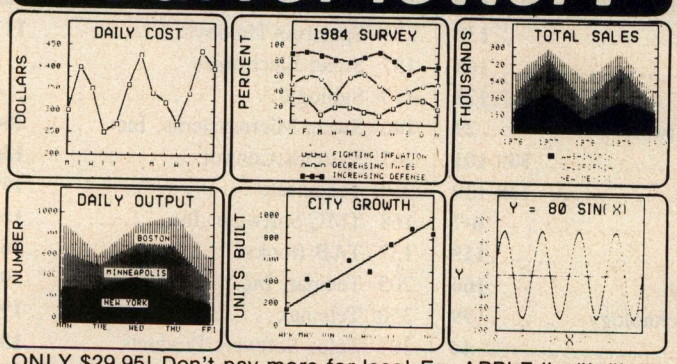

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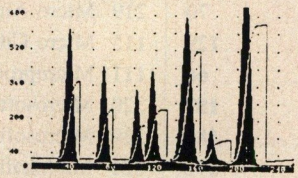

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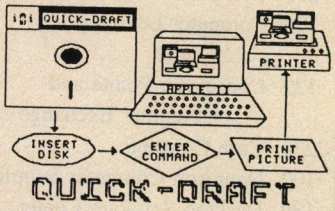

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Form **1040** U.S. Individual Income Tax Return **1984**

For the year January 1-December 31, 1984, or other tax year beginning , 1984, ending , 19 | OMB No. 1545-0074

Use IRS label. Otherwise, please print or type.

Your first name and initial (if joint return, also give spouse's name and initial) | Last name | Your social security number

Present home address (number and street, including apartment number, or rural route) | Spouse's social security number

City, town or post office, State, and ZIP code | Your occupation | Spouse's occupation

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If joint return, does your spouse want $1 to go to this fund?. . Yes No

Note: *Checking "Yes" will not change your tax or reduce your refund.*

For Privacy Act and Paperwork Reduction Act Notice, see Instructions.

Filing Status

Check only one box.

1 Single
2 Married filing joint return (even if only one had income)
3 Married filing separate return. Enter spouse's social security no. above and full name here.
4 Head of household (with qualifying person). (See page 5 of Instructions.) If the qualifying person is your unmarried child but not your dependent, write child's name here.
5 Qualifying widow(er) with dependent child (Year spouse died ▶ 19). (See page 6 of Instructions.)

Exemptions

Always check the box labeled Yourself. Check other boxes if they apply.

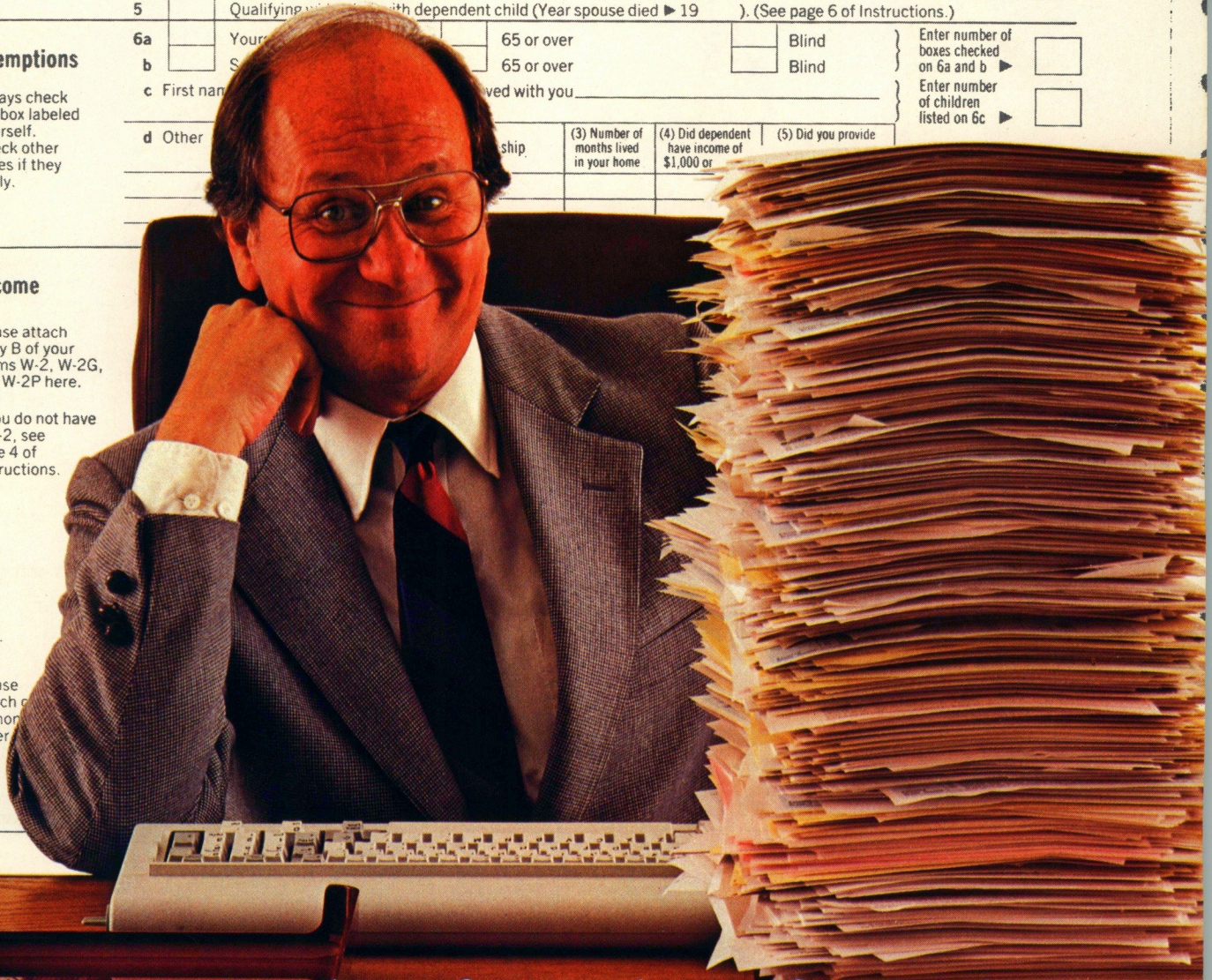
6a Yourself 65 or over Blind
b Spouse 65 or over Blind
Enter number of boxes checked on 6a and b ▶
c First name of dependent child listed below who lived with you
Enter number of children listed on 6c ▶
d Other dependents: (1) First name (2) Relationship (3) Number of months lived in your home (4) Did dependent have income of $1,000 or more (5) Did you provide

Income

Please attach Copy B of your Forms W-2, W-2G, and W-2P here.

If you do not have a W-2, see page 4 of Instructions.

Please attach check or money order here



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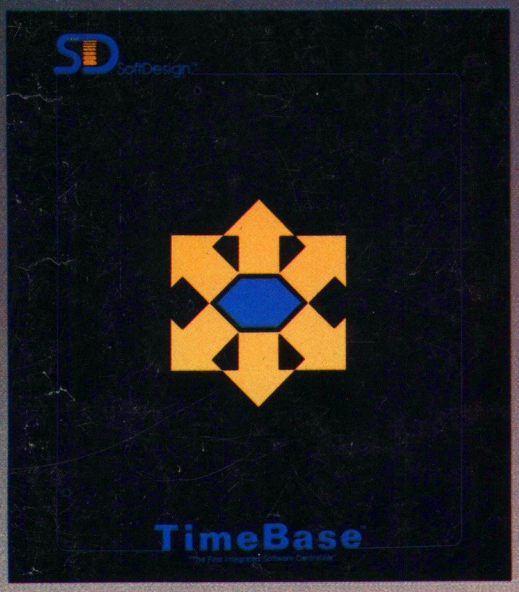

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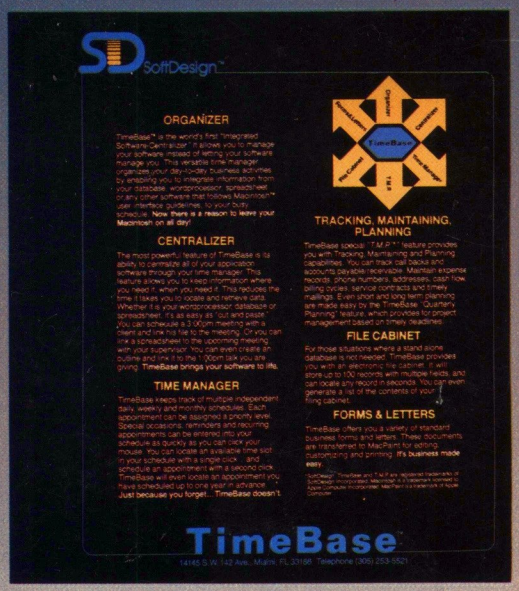

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